

A
R E V I E W

Of the WORKS of the

Royal Society of LONDON;

CONTAINING

ANIMADVERSIONS on *such* of the *Papers*
as deserve PARTICULAR OBSERVATION.

I N E I G H T P A R T S :

Under the several HEADS of

ARTS,
ANTIQUITIES,
MEDICINE,
MIRACLES,

} { ZOOPHYTES,
ANIMALS,
VEGETABLES,
MINERALS.

By *J O H N H I L L*, M. D.

Acad. Reg. Scient. Burd. &c. Soc.



Like a rolling Stone
Tby giddy Dulness still shall lumber on,
Safe in its Heaviness can never stray,
And licks up ev'ry Blockhead in its Way.

DUNCIAD, Book III.

L O N D O N :

Printed for R. GRIFFITHS, at the *Dunciad* in *St. Paul's Church-*
Yard, 1751.

REVIEWS

Of the Works of the

Royal Society of London;

CONTAINING

ANIMADVERSIONS on Facts of the Papers
as delivered PARTICULAR OBSERVATION.

IN EIGHT PARTS:

Under the several Heads of

ARTS,	{	ZOOLOGY,
ANTIQUITIES,		ANIMALS,
MEDICINE,		VEGETABLES,
MIRACLES,		MINERALS.

By JOHN HILL, M.D.

Acad. Reg. Scient. Burd. Soc. Soc.

—Like a rolling stone—

The golden Bunch's full hand's eye,

Soft hairs shining can never dry,

And sticks up coldy Blackhead in its eye.

DUNCAN, Book III

L O N D O N :

Printed for R. GRANTHAM, at the Diamond in St. Paul's Church

—Year 1751.

T O

MARTIN FOLKES, Esq;

PRESIDENT of the

ROYAL SOCIETY.

S I R,

COULD I want Inclination to inform the World of the great Respect I have Reason to mention your Name to it with ; yet you have so natural a Right to the Patronage of these Animadversions, that it were at once unjust and ungrateful to rob you of the Honour.

It is to you alone that the World owes their having been written ; the Purport of the more considerable of them has been long since delivered to you in Conversation ; and if you had thought the Society deserved to escape the Censure that must attend this Method of laying them before the World, you might have prevented it, by making the necessary Use of them in private.

Nor is this, Sir, the only Sense in which you have been the great Instrument of their Production ; since it cannot but be acknowledged, that if any body, except your great Self, had been in the high Office you so worthily fill at present, the Occasions of many of the more remarkable of them could not have been received by the Body, under whose Countenance alone they claim their Places in this Work.

The Virtues of the Patron are usually the favourite Theme of the Dedicator ; nor are there wanting, Sir, in

you, many, which for my own Sake I ought to make the World acquainted with. The Manner in which you represented me to a noble Friend, while to my Self you made me much more than I deserved; the Ease with which you excused yourself of this; the Unconcern with which you forgot you had excused yourself; and the Solemnity with which, in the Face of Almighty God, you excused yourself again; when we remember, that the Whole was done within the Compass of a Day, are surely Virtues, that I of all Men ought not to pass over in Silence:

Your Manner of mentioning me in my Absence, while Politeness was out of Countenance at your Complaisance to me when present; and, finally, your Representation of a Letter, which your avowing your Innocence had procured from me, and which might have been the Means of that Accommodation you were not ashamed to say you desired, are Circumstances also that I must not pass over without their Share in this Eulogium: They are Incidents that cannot but inform me, in the most sensible Manner, of your true Character; and that cannot but testify to the World, that you are as full of Honour as of Philosophy, as worthy to be a Friend, as to be a President of a *Royal Society*.

I am, SIR,

With all due Respect,

Your very humble Servant,

John Hill.

P R E F A C E.

SCARCE any Treatise of so little Consequence to the World as the Nature of the Subject renders this, has, perhaps, ever been so much, or so variously spoken of before its Appearance. What it is, itself must shew; what has been the Occasion of the Publication of it, its Author is in a Manner called upon to declare.

An Attachment to the Studies, for the promoting of which the Royal Society was established, he owns has carried him often to their Meetings, tho' the Manner of treating them there would not suffer him to add himself to their Number; and that the Opportunities of Experimenting have long brought a select Set of the Members once a Week to his House. The Observations made at these Meetings are somewhat too pompously recorded in their Transactions; and his Name, with an Addition, under which he had been used to be addressed before he had the Honour of a Degree of Doctor of Physick, now stands on the List of the Members of the Body.

It is not wonderful from these Circumstances that his foreign Correspondents supposed him a Member of the Society, nor is it very wonderful that he could not be pleased with being supposed a Member of a Body that he saw declining so fast in its Reputation. He had been taxed with one of the Errors of the Society, by a Correspondent of the first Rank in Literature in France, and in his Answer had said, "I have already set right the Error you complain of; but you are to know, that I have the Honour not to be a Member of the Royal Society of London."

The Letter in which this unlucky Sentence stood, lay unfinished on the Author's Table, when one of the Society, earlier

lier than the rest, came in upon the accustomed Visit : Before the Author came to him, he had read at least this Part of it; and we are not to wonder, that he who could obtain Intelligence in that Manner, could also divulge it. *Hinc illæ Lachrymæ !* Hence all the Commotions that have since disturbed this philosophick World.

After this Piece of secret History, it will not be easy to persuade the World, tho' four Times four hundred Mouths have been long busied in attempting it, that the Author ever could be prevailed upon to have his Name, as really his, upon the List. To give the Appearance of a peculiar Enmity to this Review of the Works of the Society, it has been very freely asserted, that he had put himself to the Ballot for Choice, and been rejected by a great Majority. It is condescending almost too low, to answer an Assertion that carries its own Refutation with it, but the Condescension is all the Difficulty that attends the setting the Characters of those who have said it, in a very fair Light.

The Elections into the Royal Society are in great Form ; a Recommendation is drawn up in Writing, signed by several of the Members, who declare the Person worthy of that great Honour ; this is hung up in the Room of their Meetings a Quarter of a Year, and at the End of that Time it is put to the Ballot, whether the Candidate shall be received. If it were true, that the Author of these Animadversions was ever so recommended, or so balloted for, the Paper must remain, and those at least who gave the Negative Balls would remember that they did so. No such Thing ever happened ; nor will a Member of the Body after this, probably, ever venture to whisper that he thinks there did.

Tho' People's Intentions are not easily discovered, when there are no Actions to declare them, it happens in this Case
that

that even Intention might be proved by Evidence always to have been in this Author determinately and immoveably on the Side of avoiding what these Gentlemen suppose an Honour ; but it would be a mean Triumph to add more Infamy to Characters too black already ; nor is it necessary to go farther than Conviction.

The Author's own Judgment has been very severely arraigned, for his disputing that of the Society ; and there remained no Method of having the Cause determined, but the submitting it in this Manner to the Publick. If he is merry in some Places, let it be considered, that the Subjects are too ridiculous for serious Criticism ; if he is positive in others, let it not appear too assuming ; he pretends to nothing but the knowing more than the Royal Society of London appears by its Publications to know, and surely a Man may do that, and yet be very ignorant !

That the Work, however, might not be without its real Use, an Error is nowhere exposed without the establishing the Truth in the Place of it ; and the Author has no Wish in regard to it, but that the Society may, by Means of it, become ashamed of what it has been, and that the World may know he is not a Member of it, till it is an Honour to a Man to be so.

Among the Members of it, there are Men great in all Senses of the World, Men esteemed in the highest Degree by the Author of these Animadversions, and by whom he thinks it his greatest Honour to be esteemed : The Subject of Complaint is, that a few busy and ignorant Persons thrust themselves into Employment, while those who are able to do the Body Credit, refuse to join their Labours to those of such unworthy Associates, or even to countenance with their Appearance the Meetings where such Business is transacted. These see too clearly to suppose a Censure of the Society under its present Management, an Attack upon their separate Cha-

Characters; they agree with the Author in his Opinions, and seem determined to make this Work the Basis of a Reformation that will set the Body they belong to above the Reach of an Attack of the same Kind for the future. How much such a Reformation is wanted will appear from the succeeding Pages; how long it has been wanted, and how much the greatest Men of other Times have been of this Author's Opinion about it, may appear from the following Quotation, to which nothing need be added.

“ There is no Study more becoming a rational Creature, than that of Natural Philosophy; but as several of our modern Virtuoso's manage it, their Speculations do not so much tend to open and enlarge the Mind, as to contract and fix it upon Trifles.

“ This, in England, is, in a great Measure, owing to the worthy Elections that are so frequently made in our Royal Society. They seem to be in a Confederacy against Men of polite Genius, noble Thought, and diffusive Learning; and chuse into their Assemblies such as have no Pretence to Wisdom, but Want of Wit; or to natural Knowledge, but Ignorance of every thing else. I have made Observations in this Matter so long, than when I meet with a young Fellow that is an humble Admirer of the Sciences, but more dull than the rest of the Company, I conclude him to be a Fellow of the Royal Society.”

Tatler, No. 236.

P A R T

PART I.

OF

ARTS,

Inculcated in the

TRANSACTIONS

OF THE

ROYAL SOCIETY of LONDON.

P A R T I

THERE is nothing by which a publick Body can so justly recommend itself to the World, as by the Invention and Improvement of useful Arts: The Society whose Publications are to be the Subject of our Animadversions, will be found by the following Chapters to have been sensible of this Truth from its earliest Establishment, and to continue perfectly convinced of it to this Time. The Works of Capt. Silas Taylor do Honour to some of the first Numbers of the Philosophical Transactions in this Respect, and those of Mr. William Arderon to many of the latest.

The Number of the Arts inculcated by this Society, upon the whole, is very considerable: and, to do Justice to their several Authors, they seem all of much the same Utility in their End, and of much the same Practicability. We might complain indeed of the Authors of some of them for delivering only the Principles on which useful Arts might be founded, without adding the least Hint of their Intent in the Discovery; but this we have attempted to the best of our Power to make amends for, in the Second Book of this our First Part: The Discoveries, which make the Subjects of the First Book of it, have not required this Assistance from our Hands, but are delivered at large, and in their proper Form.

ROYAL SOCIETY OF LONDON.

PART I. BOOK I.
Of ARTS, invented, improved, or recommended
by the ROYAL SOCIETY.

CHAP. I.

A Way to kill Rattlesnakes.

THE ingenious Author of the Paper, in which this Societarian Method of destroying these poisonous and terrible Animals is published, is Capt. *Silas Taylor*. It is indeed a kind of martial Atchievement, and worthy the Title of the Man who gives it; and as we dare venture to affirm that it will take place as well upon our own poisonous Serpents, as on those of *America*, we could not omit giving it a conspicuous Place, in a Work intended like this of ours, for the general Benefit of Mankind. The Method is delivered so early as in the third Number of the Philosophical Transactions, and runs thus: Catch a Rattlesnake, as large and vigorous as you please; fix it in any Manner that you will, so that it cannot possibly get away; then procure a cleft Stick, and put into the Notch of it, a Quantity of the bruised Leaves of *wild Pennyroyal*; direct the End of the Stick towards the Serpent's Nose; as he avoids it, still pursue him with it; and in half an Hour's Time he will be killed by the mere Scent of the Herb.

The Societarian Miracles never fail of being well attested. Capt. *Silas Taylor* scorns to be an Inch behindhand with his Countryman Mr. *Paul Dudley*, hereafter often to be remembered, in his Form of Attestation: he assures us, that he saw the Experiment made himself; and adds, that it was done in the Month of *July*, when those Serpents are in their utmost Vigour. Who shall dare to invalidate the Testimony of this inestimable Pair, the *Paul* and *Silas*, scarce less authentic with the Body of

these Philosophers, than their Names-fake Brotherhood with that of the first Christians? We are convinced, that no Member of the *Royal Society* will ever question the Fact; and the Author of it, in our Opinion, demands, at least, an equal Share of Reputation with that venerable Ancient, whoever he was, that invented the famous Practice of catching Sparrows by laying Salt upon their Tails. It may be objected indeed, that the one of these Authors was jocose, the other serious; but we can think it no Crime in Capt. *Silas* to have so necessary a Quality of a Philosopher as Gravity.

If the World should wish to see this amazing Discovery paralleled by another more modern Instance, we have a very late one in a Countryman of our own, the ever to be remembered Inventor of the Powder for *killing of Fleas*. The Method of using this was very like that which the Captain here prescribes for his Pennyroyal. The Flea was to be held conveniently between the Thumb and Finger of the Left-Hand, while a very small Quantity of the Powder was applyed to the End of its Trunk; after which, if the same Flea could be proved ever to have bit the Person again, he was to have another Paper of the Powder for nothing. How unhappy was it for the ingenious Inventor of the Method of destroying these Vermin, that he did not apply himself to the *Royal Society*! the very first old Woman he sold a Paper to, unluckily asked him, whether, when she had got the Flea, if she should crack it under her Nail it would not be as well? The poor Fellow could not but answer, that *that Way would do too*, and was so thunderstruck with the Objection that he never sold another. Such is the Misfortune of a Man's applying himself to old Women, and being upon the Spot, and in the Way of having impertinent Questions asked him: Had he lived in *New England* or *Virginia*, and only communicated his Discovery to a *Royal Society*, who of all its Members would have thought of such a trifling Objection to so useful a Proposal?

Not to set the Captain's Discovery too low, however, there is one Set of People to whom we cannot but think it our Duty to recommend it; that is the Lovers, we mean the Lovers *who read*. The very eminent and learned Mr. *Lovell*, Author of the *Pammineralogico-panbotanologico-panzoologicum*, (don't wonder, gentle Reader, at the Length of the Title, when the Book it belongs to, contains, if you will believe the Author, all the Knowledge of the World upon all the Subjects in it) recommends to those unfortunate Lovers, who are not beloved again, the Dens Caninus of the right Side of the upper Jaw of a Crocodile, to be
tyed

tyed to the left Side of the cruel Fair-one; but he says, that to have its full Force, it ought to be taken out while the Creature is alive: This has hitherto seemed to the amorous World a sort of romantic Expedition, something of kin to that called, *taking a Bear by the Tooth*; and many a hapless Lover, we believe, has hanged himself for want of Courage to undertake so desperate a Means of Relief: But see the Misfortune of not being acquainted with the Philosophical Transactions! here is an evident Remedy against all such Objections: Crocodiles are of the Nature of Serpents, and we will venture to assure the World, that Pennyroyal will as soon kill one of them as the other; here needs no more, therefore, to be cured of an unhappy Love-Fit, to command a proper Return of Passion from the cruel Maid, than to pick up some of this Pennyroyal, find out the Place where Crocodiles resort, nail one of them by the Tail to some stout Tree, and in that Situation to apply the Pennyroyal to his Nose, till he is too faint to hurt any Body; the Tooth required may then be drawn while he is living; and if the Operator be of as merciful a Disposition as a late noble Duke is deservedly famous for having been, the Nail may be afterwards drawn, and the *harmless* Creature, like Mr. B——r's Louse, may be set at liberty again*.

Before we conclude this Chapter, we should not omit to do due Honour, however, to a late Author in the same Philosophical Transactions, who gives some very substantial Reasons for suspecting, that this Plant does not actually kill the Rattlesnake, but that, if left to itself, after all the Appearance of Death that deceived Capt. *Taylor*, it would in Time come to life again: This however is no Objection to our Design upon the Crocodile; a State of Repose would serve the Lover's Turn as well as Death itself.

C H A P.

* The noble Personage alluded to here, is the late Duke of *Montagu*, famous among a thousand other amiable Qualities, for his Love to the whole animal Creation, and for his being able to keep a very grave Face, when he was not in the most serious Earnest. Mr. B——r, a very distinguished Member of the *Royal Society*, had one Day entertained this Nobleman, and several other Persons, with the Sight of the Peristaltick Motion of the Bowels in a Louse by the Microscope; when the Observation was over, he was going to throw the Creature away; but the Duke, with a Face that made him believe he was perfectly in earnest, told him, it would be not only cruel but ungrateful, in return for the Entertainment that Creature had given them, to destroy it. He ordered the Boy to be brought in, from whom it was procured, and after praising the Smallness and Delicacy of Mr. B——r's Fingers, persuaded him carefully to replace the Animal in its former Territories, and to give the Boy a Shilling not to disturb it for a Fortnight.

C H A P. II.

Two Methods of stocking Water with Oysters.

THE very ingenious Mr. *Rowlands* is the Author of the first of these curious and useful Discoveries: It stands recorded in the three hundred and ninety-sixth Number of the Transactions. The Method is this: Find out a proper Place for Oysters to live in; throw in three or four hundred live ones, and after twenty or thirty Years there will be a vast Increase of them.

What an amazing Discovery! We shall venture to give it a Character, which is very cautiously to be bestowed on the Generality of Papers in the Works of these Authors, which is, that it is certainly *a Truth*. The modest Mr. *Rowlands* seems indeed to have understood it to be too strange a Thing to gain Credit on his bare affirming it, and has accordingly brought sufficient Testimony that the River *Mene*, which divides *Anglesea* from *Carnarvanshire*, was originally stocked with them in this Manner. Surely our *Feversham* Oyster-Men have studied the Philosophical Transactions; for when their Beds of this valuable Animal become empty, they always supply them in this very Manner.

This however is not the only Method recommended to the *Royal Society*, for this useful Purpose; Mr. *Cunningham* has transmitted to that Body the *Indian* Way of doing it: Which is, by making Water upon Oyster-Shells after the Fish are eaten, and then throwing them into the Sea or Rivers again for new Oysters to grow upon them: this is a much cheaper Method than the former; but we are afraid it will not succeed unless the Place is already stocked; and then perhaps it would do as well without the indecent Part of the Ceremony.

C H A P.

C H A P. III.

A Way to make Insects, of various Colours to be used in Dying.

THE Author of this truly Societarian Paper, establishes it as a Principle, that there are many Vegetables which afford Colours, that would be of use in Dying, but that they will not stand, or remain such as they were at first; and that all these Colours may be made permanent, by their passing thro' the Bodies of Insects: he therefore establishes it, as the true Method of procuring good and useful Colours from these, to breed Insects from them. He produces an Instance from Nature, which is of the Cochineal, bred, as he firmly believes, out of the Prickly Pear or Opuntia; and gives the Method of making *Artificial Insects*, on the same Principle, out of all Sorts of Vegetable Substances; and of furnishing in this Manner a new Set of Colours, of the Nature of Cochineal, and equal to it in Lustre and Permanency, tho' of any Tint that is required, provided only, that there be any thing like it in the Vegetable World. The Process is very simple and easy, it is no more than this. Take any Herb which has a good Colour, bruise it and *press out all the Juice*, then dry it in the Sun, or in any other Heat; when thoroughly dry, cut it to Pieces, and infuse it in a large Quantity of Water in a gentle Sand-Heat for twenty-four Hours: after this, without taking out the Fæces, evaporate the Liquor till it be of the Thickness of Treacle, then set it in a Wooden or Earthen Vessel covered with Straw, but *not too close, so as to exclude the Air entirely*, set it in a shady Place, and put about it some wet Leaves, or other putrifying Matter, and place over it a Board, and on that some Straw, or the like. The Matter thus prepared, he assures us, will produce a *shelly Worm*, and from that a *Fly like Cochineal*, which will yield a fine strong Colour, but more lasting, even than that of Cochineal; nay, growing more bright with Time.

This is the Process, where a whole Plant is to be used; but the careful Author has not left us without his Instructions, when other Substances, only Parts of Vegetables, are to be worked in this Manner. If Berries of any kind are to be used, they are to be bruised, and then evaporated to the Consistence above described, and if the dried Wood of Trees, it is

to be first powdered, then boiled in Water, and evaporated to the same Consistence. Either of these treated in the same Manner, the Author assures us, will produce Insects, *of the same Colour with the Ingredients they are made from.* The Flies, he tells us, will play about the Sides of the Vessel and the Surface of the Matter, and are to be caught and dried in a Stove for use.

What can be more plain or familiar than the whole Process of this remarkable Operation! How accurately and circumstantially has the Author described the whole Method! and yet, tho' this Paper stands so early as in the Fortieth Number of the Transactions, no body has ever brought it into Practice. One would think the World in general paid no more Respect to the Philosophical Transactions, than the Author of these Animadversions does. To give our Sentiments candidly on the Subject, however, we are to declare, we are really of Opinion, that the Author himself believed what he thus recommended to the World: an Opinion we are far from entertaining in general of the Authors of the Philosophical Transactions. Nay, we are apt to believe that he had, unlike the Generality of their Projectors, gone so far as to make his Experiment himself: We will venture to affirm, that any vegetable Substance, treated as he directs, will furnish Flies, tho' we do not chuse to borrow the Author's Phrase, produce them; but that these Flies will have any thing of the Colour of the Vegetable, is certainly a Proposition too absurd for Answering; too contemptible for Censure.

It is something singular that an Author, who was to inform People of a Way of fixing the Colour of a vegetable Juice, should order it first to *be pressed out and thrown away*: If it be reserved there, his Process, we will be answerable, if any body has a Mind to try it, will succeed full as well that Way as the other.

This Author, and the Society who countenanced this Author's Paper, and published it as their own, seem to have been firmly persuaded, that the Worms and Flies grew out of the vegetable Matter, as they had been told Animals used to do out of the Mud in *Egypt* when the Sun shone upon it: We presume the Society at present are of the same Opinion, as they have never discountenanced or contradicted it. If they will be so obliging to the World as to prove this, nobody will deny, that the Insects may have the Colour of the Vegetable; but till that is done, it is our Business, upon the Plan of this Work, which is that of rooting out Error, and establishing Truth in its Place, to deliver what is the real

Fact in all this marvellous Proceeding; and explain what the Animals were, that this Author found in his Pots and Bowls, if he ever really made the Experiment. Equivocal Generation is too absurd to be believed possible in an Age so wise as this; all Animals are produced from the Copulation of Parent Animals of their own Kind; and as to Insects in particular, supposed to be bred of Corruption, the Matter they are found in has not produced them, but only received them from their Parent Females.

Every Plant bruised and set to ferment, and every Infusion of a Plant made strong enough to ferment in the same Manner, becomes, when in that State, a proper Nidus for the Eggs of Flies, and affords a proper Nourishment for their young ones: Flies are drawn together by the Smell of this Matter, they drop their Eggs into it; these hatch into a kind of Maggots; and these, after they have fed on the Matter they are produced among, undergo the same Sort of Change that Catterpillars do, and finally come out of their Cases in their perfect State, like those from which they had their Origin.

Such must have been the *Shelly Worms*, described by this Author, and such the Flies produced from them: How very just and accurate his Account is, when he says they will be like Cochineal Flies, every Body must be sensible, who knows that the Cochineal is no Fly at all. The peculiar Instruction given not to close up the Vessels, so perfectly as to exclude the Air entirely, is a very good one; for if they are not left open enough for the Flies to get in, there will certainly be no shelly Worms produced in them.

CHAP. IV.

A Way to catch Wild Ducks.

THE Royal Society of London, having been at all Times ready to promote useful Arts, have published in the Philosophical Transactions, from Time to Time, a great Variety of Methods of taking Birds, Fishes, and other Animals, useful for Food; without the Expence of Nets or Gunpowder. It would take up too much Room were we to comment upon all these; we shall only select two in each

C kind

kind by Way of Specimen, and leave the candid Reader to form from those his Opinion of the rest. The first we shall deliver is a capital one, in every Sense of the Word, and is given pretty early in the Works of this great Body ; so that it is an amazing thing that the indolent World has not yet brought it into Practice : Nothing can be more easy : The Method is this. Procure an Earthen Pot or Jar, that will come on upon your Head so as to cover it compleatly ; cut two Holes in it for the Advantage of seeing, and then fastening it about your Neck with a Bandage, take off your Clothes, and walk into the River where the Ducks are : take care to enter above them in the Stream, and to skulk down in such a Manner, that only your Head, thus covered with the Pot, be above Water : Thus move softly down to them, as if carried by the Current, and they will only take the Jar for some loose Thing floating on the Water. When you are among the thickest of them, take one by the Legs and pull it under Water, then seize upon another in the same Manner, and so on, till you have taken the whole Covey ; and then march out again. This is an Art of *Indian* Origin ; Mr. *Strachan* assures us it is practised to great Advantage in the Island of *Ceylon*, and strongly, under Countenance of the Authority of a *Royal Society*, recommends it to the Practice of these Nations. There is nothing of this kind that can be offered to the World, but a surly Critick may find some Disadvantages attending it ; we are very certain, however, notwithstanding all that may be objected to this Philosophical Duck-hunting, that if the Legislature will provide for no People's being employed in it, but such as are five Feet and a half high ; and for the making all the Rivers, frequented by Wild Ducks, sound at the Bottom, and just five Feet deep ; there will require nothing more than some Art of making Wild Ducks less wild than they are at present, in order to the bringing the Scheme into Execution. If we might have leave, however, to add our Thoughts as to an Improvement, in the very Art itself, it should be, that the Artist do not take the Duck by the Legs, for fear of some little squalling and fluttering in the pulling her under, which might fright the rest away ; but that he take the Opportunity of her thrusting her Head under Water, and pull her down that Way ; they will then come down without Noise, and only seem to their Companions to be diverting themselves with diving. If it be objected, that these Opportunities are not likely to happen in deep Water, nothing is so easy as to provide for them ; the Person need only carry a Trencher

with some Food upon it, fastened by a String round his Waist, so as to rise to within five Inches of the Surface of the Water, the Ducks would be continually thrusting down their Heads at this, and might be taken in any Number.

If any Method of Duck-catching can be supposed to excel this in Ease and Practicability, it is the Bacon Scheme, proposed to this Society some Years since, but invidiously suppressed, like many other noble and useful Discoveries, because it seemed to interfere with this Method already published: we, however, who are much above such Views, and are very earnest in the Attempt of making this an useful Supplement to the Transactions, shall give the due Honour to the very ingenious Member who proposed it, by delivering it here. The Method is this: tie to the End of a long String a Piece of fat Bacon, two Inches long and half an Inch thick, let the other End of the String be fastened to a Tree or Post, then leave it the whole Night: The first Duck that comes will eat the Bacon, and, as the worthy Member who proposed the Method observes, will void it again in a few Minutes; it will then be gobbled up by another, and after that by a third, and so on, each voiding it soon after the swallowing, and the String continuing fixed to it, and regularly passing thro' the Guts of the whole Covey: thus in the Morning a whole String of Ducks will be found ready caught, and there needs only the drawing in the String to take them all up.

Whether this rival Method of Duck-catching was proposed during the Life of the Author of the first, we cannot tell; but it should seem to have been so by the Disregard that was paid to it; nor can we pretend to affirm, whether it was proposed to the whole Society, or only to such a Set of the Members, as at this Time manage that Body, in one of their private Meetings: as we are well assured, however, that its Author was a Member of the *Royal Society*, and that he devised it for the Good of that Body, and was desirous of having it printed in their Works, we cannot but think it our Duty to preserve the Remembrance of it, and at the same Time to remind the Society, from the utter Impossibility, as the Case stands, of settling the Chronology of this Discovery, how careful they ought to be in registering every thing that comes before them, and of what real Importance their Publications are to the World.

A Way to take off the Fisby Taste of Wild Fowl.

THE Method is extremely simple and familiar; it is no more than the burying the Fowl two Hours in the Ground. It is delivered in the twenty-seventh Number of the Philosophical Transactions: It's Author Mr. *Stubbes*. We flatter ourselves that no body will be so hardy as to doubt the Success of it, as it comes so strongly recommended; but we think the Author chargeable with great Carelessness and Inaccuracy, in that he has omitted to tell us, whether the Fowl should be thus buried before it is dressed or afterwards.

CHAP. VI.

A Way to take Land Fowls.

THE Practicability and Excellence of Mr. *Strackan's* Method of catching Wild Ducks, as well as of that of the other worthy Member of the same Society, whose Name is unfortunately lost to us, and whose Discovery would perhaps have been so too, but for our Care in preserving it, cannot but be acknowledged by every candid Reader. They extend, however, but to one half of the Fowler's Business, and leave him as much to seek, in regard to the catching those Birds which do not swim, as he was before. The *Royal Society* do not leave People in the Lurch in this Manner: The Philosophical Transactions of that great Body affords us a Method yet more simple and easy than either of the former, and equally practicable with either of them, which has for its Object professedly those Birds which do not frequent the Waters. This is published so early as in the hundred and thirty-seventh Number of the Transactions; and we have equal reason to wonder, in regard to this, as in regard to the other, that it has not been brought into general Use. Its Author seems to have seen it often practised with Success, and this Author is no less a Man than Sir *Robert Moray*, that very Sir *Robert* who gives the same Society an Account of

of the Barnacles, and assures them, that he had himself seen the young Birds come out of the Shells.

The Method is this: Chuse a damp misty Evening, get upon a Hill, or some other exposed Piece of Ground, lie down flat upon your Back, and open your Breast, continue in this Posture for some Time, till the Birds that are flying about perch upon your Breast, when you have nothing to do but to slide your Hand gently towards them, and seizing them by the Legs, use them at your Discretion. Vast Numbers, Sir *Robert* assures us, are thus taken in a little Time in the Island of *Hirta*, where the Method is in common Use.

Can any body guess what it is that the Birds are to take the naked Breast of a Man for on this Occasion? perhaps it is more easy to guess what the Society ought to have taken the Man for who told them the Story. As we are extremely ambitious of bringing all the Discoveries of the *Royal Society* into Use, we were thinking of recommending it to them, in order to make this more certain of Success, to apply for an Act to make Birds blind from St. *Andrew's* Day next; but we are apt to fear, that People who are not Societarians would be ready to suspect, that the Birds in this Case would not be able to find their Way to the People: Upon the whole, tho' we are for doing all due Honour to Sir *Robert* for this curious Communication, we cannot pay him a Compliment at the Expence of our Justice to the Inventor of the famous Method before celebrated of catching Sparrows by laying Salt upon their Tails, from which the first Hint of this was evidently taken.

CHAP. VII.

A Way to catch Carps.

WE have the same Honour to pay to this Discovery as to the two former, in Regard to the easy Practice of it; and the same Complaint to make of the scandalous Neglect, with which People of all Times since the Establishment of the *Royal Society*, have treated the Publications of that wise and useful Body on its Account; since, tho' it has been long published, no body, that we have heard of, has ever put it in practice. It stands in Number ninety-five of the Transactions, and
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its Author is Mr. *J. Templer* : the Method is this ; feel in the Water of several Ponds, till you find some that is warmer than ordinary, in this you may be assured there are Carps in Plenty ; go to the Sides of it, and grope among the Weeds till you feel some of them ; then getting your Fingers under the Belly of one of them, tickle it for some time, and finally slip your Finger into the Gills, and toss it out of the Water. As Carp swim in Shoals, the Author of this curious Discovery tells us, a great Number are thus to be caught in a little Time ; nay, he informs the World also of another Secret still greater than this ; which is, that if you can find where they lie in clear Water, you may catch them by throwing a Casting-Net over them. As to the Affair of Tickling, and the other of the Casting-Net, we are apt to believe they were both known some time before this Gentleman was born ; the great Discovery he has made, is, that we may know where these Fish are, by the Heat of the Water : but like all the other Societarian Authors, tho' he has pointed out an admirable Discovery, he has omitted to tell us the Means of making use of it. Tho' the Water in Ponds where Carp are, is said to be warmer than that of other Places, it is not meant that it is boiling hot ; and as to very small Degrees of Difference, a Man may easily mistake them, and be led to overlook a Pond well stored, or to grope round a dozen that have nothing in them. We therefore would propose it to every Body who goes out on this Expedition, to carry a Pocket Thermometer about him, which, by plunging it into the Water of the several Ponds, will inform him which has, and which has not Carp in it ; unless the Difference of Heat should happen to be owing to the Situation, Exposure, or other Accidents of the Place.

In fine, if this Gentleman's Scheme could be brought to bear, which it certainly may be by cutting down all Trees about Carp-Ponds, keeping them all equally clear of Weeds, and making them all exactly of the same Depth ; it certainly would be of great use to the People who trade in robbing Fish-Ponds, it would lead them to their Prey with much greater Certainty, and prevent their wetting their Fingers in vain on many an Occasion : As to the Owners of the Ponds, they probably know whether there are Carps in them or not, without his Assistance.

C H A P. VIII.

A Way to catch Roach and Dace.

AS Roach and Dace are not of the Number of those Fish that will lie still to be tickled, another Method was necessary to the taking of them: The *Royal Society*, ever studious for the good of Mankind, and convinced, that whatever can any Ways conduce to their Service, however trifling it may appear to some, will never prove disagreeable to the generous and humane Mind, has obtained from the very painful Mr. *Arderon*, often to be commemorated in these Animadversions, a very curious and useful Method of catching them, which, as the Author informs us, is practised with Success at a Country Town five Miles from the City of *Norwich*: but the careless Man has forgot to tell us whether East, West, North, or South of that Town. The Method is this.

They cut a Thorn of the common White-thorn Bush, and fashion it into the Shape of the Consonant V, but very wide at the Top: The Reader is unhappily left in the Dark however as to the Manner in which this is executed: they tie a Thread to the Part of it which represents the narrow Bottom of the V, and drawing a Worm over one of the Points, they carry it on to the other, taking in the String with it; in this Manner they let it into the Water, and when the Fish has swallowed it, the Jerk he gives, in order to get away, draws the Thorn across in his Mouth, and he is hung fast by it.

This curious and useful Discovery stands so late as in the four hundred and seventy eighth Number of the Transactions, and may serve as an Instance of the Pitch those Publications are arrived at, under the Presidentship of *Martin Folkes*, Esq; What is that Society that can attend in full Body to such miserable Matters? that can approve, applaud, and return Thanks for the Communication? can solicit a Correspondence with the Author, and request more Papers from him? nay, and can order this to be printed in their Transactions, and be at the Expence of engraving a Figure to express it? To set the Enquiry in the fairest Light, what is the utmost Use this important Discovery can possibly be of? Why, the very poorly supplying the Place of a Fish-hook, which might have been bought

bought for less than a Farthing. To whom is it addressed by the Author? to the *Royal Society*: Has he the Head to imagine that the Members of this Society, Gentlemen who pay two and fifty Shillings a Year for leave to be laughed at, will ever think of saving five Farthings a Year in so awkward and troublesome a Manner? It has however been read to, and approved by the *Royal Society*: We had the Happiness of being present on the Occasion, and of seeing the President rise with a majestic Importance from his Chair of State, at the Conclusion of it, and say, *Gentlemen, you will be pleased to return your Thanks to Mr. Baker, and desire him to return your Thanks to Mr. Arderon for this new, curious, and useful Communication.* If we could have supposed, gentle Reader, that a Paper like this could have come to the Society any other Way than thro' the Hands of Mr. Baker, we should have taken an earlier Opportunity of informing thee of that Fact.

When a Paper has been thus received and applauded by the *Royal Society*, it is no longer its Author's, but the Society's, in regard to the Opinion of the World: the Society stamps its Value on it and publishes it: But to what End is this done? for the Benefit of the Readers of the *Philosophical Transactions*? surely, no: The same unanswerable Reason holds against this as against its being of any Use to the Members of the Body: People who hold Money so very cheap, as to throw away half Crowns on *Philosophical Transactions*, will never want to save Farthings in this Manner.

With what Intent then could this Paper be sent? with what Intent could it be suffered to be read? with what Intent could it be published? As to the first Question, the Author's Ambition for the Honour of having his Name printed in the *Philosophical Transactions*, will answer for it; and as to the others, they are both resolvable into the same Principle; Mr. Baker patronized the Paper; and till we can get rid of the unlucky Opinion, so boldly advanced by some, that *Mr. Baker is the Royal Society*; we shall not wonder that every Thing is received and approved, that has the Honour of his Approbation first.

But what if, with all this Unconsequentialness about it, the Communication should at last be false? We have lamented, in the Beginning of our Observations on this Paper, that its Author did not tell us as well as the Distance of the Town where it was practised from *Norwich*, whether it lay before, behind, or on one Side of that City of Wonders; and we shall here explain our Reasons for it. A Man is now in Town
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from *Norwich*, who declares that he has seen Roach caught six Miles off from it, but that this is not the Method. Indeed, it appears very probable, that all the Hint Mr. *Arderon* received for this Paper, was, that the People had a Way of catching Fish with a Thorn, by tying a String to its Middle, and that the Mechanism described and figured in this memorable Paper is entirely his own: Thus much, at least, we are assured of, that the Method of the People, six Miles from *Norwich* one Way, is, to cut off a strait Thorn from the Tree; sharpen what was the Base like the Point; tye the String to the Middle, and so draw the Worm over it; in Consequence of which, the turning of the Thorn in the Throat, after the Worm is swallowed, sufficiently answers all the Purposes of a Hook: We are confidently informed that this is not only the Way, but the only Way practised by those People, and that they do not pretend to it as any original or valuable Discovery, but meerly use the Thorn to supply the Place of a Piece of Iron-Wire, sharpened at each End, when they have not Opportunity of getting that Apparatus. We hope the candid Reader, when he considers the Importance of the Subject, will pardon this elaborate Disquisition.

C H A P. IX.

A Method of making Salt Water fresh.

WHAT an amazing thing it is, that the World should have so long been at a Loss for a Method of making Sea Water fresh, nay, and should still continue to be so, while all the Time there is a simple and easy Method proposed for the doing it, so early as in the seventh Number of the Philosophical Transactions? Surely People are not such Infidels as to doubt the Truth of Things published by this grave and learned Body. The Method of effecting so great and useful a Change, is no more than this.

Let a Vessel of Wax be prepared hollow within, and every Way tight, plunge it into the Sea, and after some Time take it out again.

We are assured by the Author of this Paper, that on opening it, it will be found full of sweet Water, no Particle of Salt having penetrated thro' the Wax with it.

We are really apt to believe, that if the Vessel be made perfectly tight every Way, as the Author directs, that all the Water that is

found in it, will be sweet indeed. How amazing is it, that while such a Discovery of this has stood in print under such an Authority, People should pretend to be in want of the Effect of it! How unjust a Neglect does it bespeak of the Philosophical Transactions! But the Society may comfort themselves with remembering, that even a Prophet is without Honour in his own Country.

C H A P. X.

An unusual Method of planting Mulberry-Trees.

THE Author of this curious Dissertation, gives us an admirable Instance of the Use the Philosophical Transactions were intended to be of to the World, and of the very settled Minds of the Authors concerned in writing them. He wrote at a Time when People were very hot upon the Scheme of propagating Mulberry-Trees, for the sake of Silk-Worms; he encourages them in the Attempt, by assuring them, that himself had planted ten thousand according to an uncommon Method of his own Invention, which advances them two or three Years Growth, but he is not good-natured enough to tell any body what the unusual Method was.

The World, however, we find had no great Reason to be dissatisfied about this; for in the Conclusion of the very same Paper, he says, that upon the whole, he is apt to believe the best way would be to sow some Acres with Mulberry-Seed, and as the young Plants grow up, to cut them with a Scythe.

Papers of this kind carry in themselves too obvious Testimonies of their Merit to need our Animadversions.

C H A P. XI.

A Method to make Fish shine.

Nothing is better known to the Enquirers into the Nature of the luminous Emanations from dead animal Bodies, than that they usually appear at a Time when the Substance begins to putrify. The
Royal

Royal Society of London, no sooner were informed of this singular Circumstance, than according to their usual Rule of judging of things, they came to a Determination, that Stinking and Shining were, in those Substances that would shine at all, one and the same Thing; and as it was a Phænomenon People might often wish to see, a very worthy Member of theirs, *Dr. Beal*, gave the World the Method of producing it; which is no more, as it stands in the thirteenth Number of the *Philosophical Transactions*, than this: Cause a couple of Mackrel to be kept in the Water they have been boiled in till they stink, and for two or three Days afterwards.

This is a mighty easy Method; but according to the Doctor's own Confession, it is of the Number of those Experiments which don't succeed. As this is an acknowledged Fact, we are apt to believe the whole might as well have been left out of the *Transactions*.

C H A P. XII.

A Way to make all Sorts of Trees, Plants, and Fruits, grow to an extraordinary Bigness.

Whoever knows the Use or Value of Timber, must be sensible how infinitely the World is obliged to the *Royal Society*, for informing them of a Method of bringing it to a more than ordinary Size. The Subject is of the utmost Importance, but we cannot say quite so much of the Paper in which it is treated of. The Method recommended for the effecting it is, to sow the Seeds or Kernels, at the very Instant when the Sun enters into the vernal Equinox; and afterwards to transplant them precisely at the Moment when the Moon is full. The Process stands in the hundred and sixteenth Number of the *Philosophical Transactions*; who the Author of it is, we are left in the Dark: great Merit is often attended with great Modesty. Tho' this Gentleman has not, however, acquainted us with his Name, he has been at the Pains of directing us in a much more material Point; that is, in the finding this happy Moment of the vernal Equinox: To this End he directs us to burn the Branches of Vines to Ashes, and mixing these Ashes with a Quantity of clear Water in a glazed Earthen Vessel, to

watch carefully for the Moment, when of themselves they shall make the Water turbid. This he assures us will happen punctually on the Instant he directs for the sowing. What Contempt must it derive upon a Society of Men, who pretend to Reason, Learning and Philosophy, to receive such an old Woman's Tale as this is ; to print it among their Discoveries ; and not to know, that despicable as it is, it is stolen. For the Consolation of those, who shall be of so truly societarian a Turn, as to put this into practice, we shall venture to affirm, that the Sun will have at least as much Influence on the Ashes as on the Seeds, or as the Moon will have on the Plants; and to prevent Mischief, we shall admonish the industrious Gardener, that if he has no Vines to spare, the Ashes of Nettles or Thistles will answer full as well. But to leave a Subject too low for Animadversion, let us turn our Eyes to one, the Success of which is much more certain ; which is,

C H A P. XIII.

*A Way to make Smelts grow to an extraordinary
Smallness.*

Whether this be the Product of the same Genius with the former, we are left in the dark, there being no Name put to that : This is owned by the very eminent Mr. *Dudley*, the *Baker* of the Age he lived in ; the Publisher of more Papers than any Man of his Time ; and to say a bold Thing, those of the least Value of any. This Process is delivered in Number three hundred and seventy-four of the Transactions, and is comprized in a few Words. Take the Fish out of Water which affords them a great deal of Nourishment, and put them into such as affords them but a little. That the World might not doubt the Truth of so strange and incomprehensible a Problem as this, the Author assures us, that the Experiment was tryed in the Neighbourhood of his own House. We are far from doubting the Possibility of such a Fact as this ; but from the known Character of the Author, and from certain Circumstances of the Relation, we are apt to believe there is some small Error in the Observation : He tells us, that from Smelts of two Ounces and a half Weight, they degenerated so as not to weigh so much as
Five

Five Penny Weight a Piece. It would have been very happy for the World to have known, if these degenerate Smelts had any Prickles about them. It is highly probable, the Smelts thrown into the Pond perished, and that the small Fish this judicious Author afterwards found in their Place, were Stittlebacks or Minows. That Smelts should degenerate to so very small a Size, we hold utterly impossible; tho' we perfectly join with Mr. *Dudley*, as to the Rationale of the Method proposed for the effecting it.

C H A P. XIV.

A Way of making Vines grow over the Roof of a House.

THIS is of the Number of those most miraculous and amazing Secrets, which the *Royal Society*, conscious of the Impossibility of any body's finding out for themselves, have been particularly copious in describing. The Method is this: Let the Vine grow up to the Eaves of the House with a single Stem, and then leave it to branch upon the Tiles as much as it pleases. This wonderful Secret is communicated in the ninety-third Number of the *Philosophical Transactions*. Its Author is Mr. *Templer*, the Gentleman, who in another Paper, instructs People to catch Carp, by getting their Fingers in at their Gills, and tossing them out of the Water; a Thing which he assures them is very easy, after you have tickled the Fish for some Time.

C H A P. XV.

A Way to wake Weavers; applicable also to People of all other Trades and Professions.

THE *Royal Society* has always shewn a particular Respect to useful Inventions, especially such as regard the common Occasions of Life. As the Waking from the Death of Sleep, which we nightly suffer, is a Thing of the utmost Importance to us, and might be forgot perhaps, but for some mechanical Contrivances of this Kind, it is no Wonder, that they received a Paper containing such a one, with a particular

cular Satisfaction, and paid no common Regard to its Author for it. The most important Piece of Mechanism, invented for this Purpose, is described in the four hundred and seventy-seventh Number of the Philosophical Transactions. The Author of the Account is the very eminently ingenious Mr. *Arderon*, and Mr. *Baker* has the Honour of having delivered and recommended it to the Society.

The Author sets out in a very formal Manner, informing the Society, that Necessity is the Mother of Invention, and that what he is going to lay before them, is an eminent Instance of it. The Piece of Machinery he is to describe to them, he tells them, is the *Weavers Larum*, a Thing of very antient Use in the Place of his Abode, *Norwich*, as the Vulgar and he call it, but in the Language of People acquainted with the Philosophical Transactions, *the City of Wonders*; there having been more Miracles produced from that Place, by Means of this Gentleman, and recorded in those Publications, than from all the Cities in the World, since the Time of the Society's first Establishment.

Mr. *Arderon*, determining to go thro' a Subject of such Importance in form, begins with the *Ratio Nominis*, or Reason of the Name; in this however, the first Praise is due, not to the Author, but to the critical and judicious Publisher, Dr. *Mortimer*, who, lest we should misunderstand the Word, informs us, that *Larum* signifies *Alarm*, an Explication that does him very great Honour. As to the Addition of *Weavers*, Mr. *Arderon* explains that: he says, it was given to it, because originally used to wake the People who work at that Trade; but he takes it for granted also, that it may be of use to many People of other Trades too. From the Name, he proceeds to the Seat of the Invention; and gives many very substantial Reasons for doing the City of *Norwich* the Honour of being that Place. He suspects also, with great Shew of Reason, that the Author of it might be of the Profession for the Service of which it was invented; but he frankly acknowledges, that the Name of the Inventor is lost, and seems to lament this common Fate of the Discoverers of all great Things.

After having thus discussed the necessary Preliminaries to this important Discovery, Mr. *Arderon* says some civil Things about the Simplicity and Utility of it, and then proceeds to tell us what it is. The Apparatus for it, he informs us, consists of a Candle, a Board, a Stone, a Pulley, and a Piece of Packthread. The Board is to be marked into Spaces, answering to the Candle's Consumption *per Hour*; the Stone is

to be tyed to the End of the Packthread, and the Candle is to be set against it, and raised to such a Height, that it will burn down to it in just so many Hours as the Weaver intends to sleep: When it gets down to the Packthread, the Flame burns thro' that, and down drops the Stone; the Noise of which is supposed to be sufficient to wake the Weaver. It is greatly to the Honour of the Philosophical Transactions, that such a Piece of Mechanism stands in them; and more so, that they have not spared the Expence of a Figure at the Head of the Number, expressing what this ingenious Gentleman means, so very accurately, that it will not be impossible for a Weaver in *London* to execute a Larum on the same Model.

This, however, is not all: Mr. *Arderon*, when he has got hold of a Subject, does not chuse to quit it in this Manner: He raises Objections, as some of our Clergy are apt to do in their Sermons, for the sake of answering them; and by his Method of executing this great Part of a Projector's Task, seems worthy to be made Engineer-General to the Society he at present does the Honour of being a simple Member of. He observes, that if the Weaver should not be in a Humour to get up, the Fire may be continued along the Thread so as to endanger the House: This, however, he contrives an absolute Remedy for, by proposing, that the String in general be of Wire, and that only that Part of it be Packthread against which the Candle is placed. Another Objection is, that the Weaver, tho' willing to get up, may be so drowsy as not to be waked by the Noise; in this Case he advises the Use of a second String, which is to be tyed round the Wrist or the Thumb of the Man; he gives us the Choice of both, assuring us, that it is all one which is taken; the other End of this secondary String is to be tyed to the farther Part of the primary one; and by this Means, when the Stone falls, the Weaver will have such a Pull, that he must be a sleepy Mortal indeed if it does not wake him. Finally, to render the Apparatus yet more simple and easy, he assures us, that a Ruler may supply the Place of the Board, and that thus any Man may make himself *a useful Servant*; these are the very Words of the Author at a small Expence. We cannot but censure this Author, accurate as he is, however, for having omitted one necessary Consideration. We are apt to believe, that the Difference of Thickness of the Wick of a Candle, and of the Coating of Tallow that covers it, may make some small Difference in the Time of its burning; we therefore think, that the Author, who has

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at present given us no farther Directions about this material Part of the Apparatus, than that it should be fifteen Inches long, ought in some future Communication to give Directions to Tallow-Chandlers, to make Candles of a peculiar Kind for this Purpose; since it would particularly ill suit with the Nature of his Office to advise the Weavers to make them at Home*.

C H A P. XVI.

A Way to make Seville Oranges.

THIS is of the Number of the Arts inculcated by the *Royal Society* in the strongest Manner; not only the Theory, but the Practice of it is delivered there, and the very reverend and faithful Inventor of it, assures us of his having himself practised it with Success. We flatter ourselves, that the World will pay too much Respect to the *Royal Society* of *London*, to disbelieve any Thing related by its Members as a Fact, and countenanced with the grand Token of their Countenance and Approbation, the printing it in the *Philosophical Transactions*; Publications upon which, not only the Reputation of the single Author of each Paper, but that of the whole Body must be established or destroyed: But if we live in so infidel an Age, that People would be apt to scruple this great Authority, we bring them another, an additional one to the Facts contained in this Paper, and that no less than the *verbum Sacerdotis*. Its Author is the reverend *Francisco Lana*, a Jesuit, who assures us, that he offers it to the World, not as Conjecture, or probable Hypothesis, but as Matter of Certainty, and does no more than relate what himself had often practised. The Process, which the candid Reader will not say is unworthy the Preface, is this; Take a large Vial with a wide Mouth, fill it three Parts or more with fine Oil, go into an Orangery with this in your Hand, at a Time when the Orange-Trees are in the highest Bloom, pick off a Number of the Flowers from them, and put them into the Oil, tie over the Top of the Vial, and set it by in a quiet Place; observe it from time to time after this, and as the reverend Father assures us, you shall see the Flowers by Degrees dissolve, till there remains not the least Trace of them,

* Mr. Arderon, at the Time of his writing this, had the Honour to fill the important Post of an Exciseman.

them, but the Oil seems as pure, clear and simple as at first. In this Condition, he assures us, it will remain for nine or ten Months; but at the End of that Time, there will appear little Buds, dispersed over the several Parts of the Oil; these will by Degrees grow larger and thicker, till at length they will begin to open, and form themselves into perfect Flowers, with their *Pistils*, *Stamina*, and every other Part in Perfection: They will remain, the good Father assures us, in this State, about as long as the natural Flowers do; after which, the young Fruit will be formed from them, and will by Degrees encrease in Size, till it comes to the full Bigness of an Orange, and after this, will by slow Gradations receive the true Colour, and if suffered to remain in the Oil till fully ripe, will be as well flavoured as any Orange in the World. This is a Discovery that stands early in the Philosophical Transactions, and seems a noble Prefage of what the World was to expect from those Publications. We are apt to believe, that it will serve as well for other Oranges as for *Seville* ones; nay, and for Lemons as well as either; and if we consider the Ease of the Process, the Simplicity of the Apparatus, and the certain Success of the Experiment, we have much to accuse the Indolence of the World, for that we do not at present profit so much by it as to send for no Oranges or Lemons from abroad. The Orange Trees in our own Gardens produce Flowers enough, and what would be so easy as to convert these all into ripe Fruit, in this reverend Gentleman's Method? This, however, is not the only Art recommended by the *Royal Society*, that has had the Misfortune to be neglected.

C H A P. XVII.

Instructions for preserving Specimens of Plants for a Hortus Siccus.

THE World is indebted to Sir *Robert Southwell* for the following excellent Contrivance, which we are apt to believe, the Gentleman who recommends it to others, had not been at the Pains of trying himself, but deduced it from mere Dint of Reasoning; and then, like the Authors of many of our high flown chymical Processes, published the imaginary Success of it, as boldly as if it had been real.

The Value of a good *Hortus Siccus* is very evident, a thousand Minutiæ are preserved in the well dried Specimen of a Plant, which the most accurate Engraver would have omitted; and we have the additional Pleasure in the studying by them, that we are sure no Author to favour his System, no Designer to shew his Delicacy in a fine Figure, has misrepresented them; and that nothing is added, nothing left out of all that Nature had done in the Subject. A Collection of such real Value, deserves some Care and Attention in the making; the Method of Sir Robert Southwell is delivered in the two hundred and thirty-seventh Number of the Philosophical Transactions. He orders the Plants to be laid flat between Papers, and these put between two smooth Plates of Iron, screwed together at the Corners, and in this Condition committed to a Baker's Oven for two Hours: When taken out, they are to be rubbed over with a Mixture of equal Parts of Aquafortis and Brandy; and after this, to be fastened down on Paper, with a Solution of the Quantity of a Walnut of Gum Tragacanth, in a Pint of Water.

Among the various Methods of preserving Plants, I have tryed this, and from that Experiment am induced to believe that its Author never did so.

The Heat of an Oven is much too uncertain to be employed in so nice an Operation. The Space of Time ordered for the continuing the Plants in it, is of no Information, unless the Degree of Heat, and even the different Nature of the Plant, as to its more or less Succulency, and the Firmness or Tendereness of its Fibres, be also attended to.

There are scarce any two Plants perfectly alike in these Particulars, and consequently the Heat and Duration of Heat, that is enough for one Plant in a Parcel, (for we suppose, the Author did not mean that all this Time and Trouble were to be bestowed on every Plant separately) would destroy another. What would become of an Orchis and Mother of Thyme, committed to the Oven for the same Space of Time, no body can suppose both would come out perfect. But to wave this Consideration, the Acid is unnecessary, it destroys the Colour of many Plants; it will not recover that of others lost in the Drying, and it frequently, after the Plant is fixed down, rots both the Paper it is fixed to, and that which falls over it. The fixing Matter is also very injudiciously chosen, and as injudiciously directed. How much is equal to the Quantity of a Walnut of a Gum in Form of crooked Filaments. It puts me in mind of the Farrier's Prescription of Wormwood and Melilot, each

each a Handful, and an equal Quantity of Balsam of Capivi. Gum Tragacanth, were the Quantity of it ever so well adjusted, is the last of all Gums to be chosen for this Purpose: it requires so great a Quantity of Water to dissolve it, that its Power as a Gluten is very little. The Stalks of Plants are scarce ever to be fixed down with it, so as not to rise in a Day or two, and half the Plant is commonly loose in a Fortnight; to all this we are to add, that Plants thus preserved, are liable to have Mites and other devouring Insects bred in their thicker Parts, and to be consumed by them. The Author of this ingenious Contrivance adds, that they may be scented afterwards at Pleasure.

I believe there has not been an Instance of any body that has put his entire Method in Practice; but different People have from time to time stolen the several Parts of it. We have at this Time a Collection of some Consequence, in which the Possessor, having attempted by this Method, to give the proper Scent to a dried Rose, by a little of the Oil of Rhodium Wood, sold by our Chymists under the Name of Essence of Damask Roses, has very happily communicated the same Scent to the forty following Leaves of the Book, on which are preserved some Mints, Southernwood, Tanzy, and the Atriplex Olida, all which to this Moment smell very fragrant.

As this Gentleman has stolen the Use of the Perfume of our Societarian Knight, the eminent Mr. *Baker*, a Gentleman, whose Name will make a most capital Figure in one Part or other of these Animadversions, has stolen the Hint of his Acid. Mr. *Baker* is one of those arch Borrowers, who never make free with a Hint, but they make it their own by their Manner of applying it: he has taken Spirit of Vitriol instead of Aqua Fortis and Brandy, and has applied it to the ornamenting not the Leaves but the Flowers of his Plants; the Consequence of which is, that in his small Collection, which is about as methodically arranged, as the Gentleman's above-mentioned, there are Variations from Nature's ordinary Course, more than that plodding old Lady will give us, if she remains upon her present Footing, these twenty thousand Years. It is one of the known Properties of Acids, (I don't mean known to this Gentleman) to turn blue Flowers red, and to exalt the dusky Crimson of several others to a fine florid Scarlet. Accordingly in looking over this egregious Collection, one is first startled with the Ballote Scrophularia and Galeopsis (not that the ingenious Possessor of them knows any of these hard Names) all with florid scarlet Flowers, and are afterwards

shocked with scarlet Borrage, scarlet Hyacinths, and scarlet Succory, all produced by this new Species of Magic from the blue ones.

The Method which I have found succeed best, and by which the greater Part of my own Plants have been preserved, is this :

Take off a Specimen of a Plant in Flower, and with it one of its bottom Leaves, if it have any ; bruise the Stalk, if too rigid, slit it if too thick, spread out the Leaves and Flowers on Paper, cover the whole, with more Paper, and lay a Weight over all : at the End of eighteen Hours, take out the Plants, now perfectly flatted ; lay them on a Bed of dry common Sand, sift over them more dry Sand to the Depth of two Inches, and thus let them lie about three Weeks ; the less succulent are dried much sooner, but they get no Harm afterwards. It has been my usual Way to cover the Floor of a Garret two Inches deep with Sand in Spring, leaving Space for walking to the several Parts ; this has received the Collection of a whole Summer, the Covering of Sand being sifted over every Parcel as laid in. They need no farther Care, from the Time of laying them till they are taken up to be stuck on Paper. The Cement I use for that Purpose is thus prepared.

Early in the Spring, put two Ounces of Camphire into three Quarts of Water in a large Bottle shake it from time to time, and when the first collected Plants are ready for fastening down, put into a Pint of the Water poured off into an earthen Vessel that will bear the Fire two Ounces of common Glue, such as is used by the Carpenters, and the same Quantity of Ichthyocolla beat to Shreds ; let them stand six and thirty Hours, then gently boil the whole a few Moments, and strain it off thro' a coarse Cloth : This is to be warmed over a gentle Heat when it is to be used, and the Back of the Plants smeared over with it with a Painter's Brush ; after this lay them on Paper, and gently press them for a few Minutes, then expose them to the Air a little, and finally lay them under a small Weight, between Quires of Paper, to be perfectly dried.

It is scarce to be conceived, how strongly the Water becomes impregnated with the Camphire, by this simple Process ; a Part of it flies off in the heating the Liquor, both in the making the Cement, and in the using it ; but enough remains with the Plant to prevent the breeding of Insects in any Part of it, no one that I have ever preserved in this Way ever having suffered in that Manner. Plants may be dried very well without Sand, by only putting them frequently into fresh Quires of Paper,

Paper, or a few, by only pressing them between the Leaves of a Book; but the Sand Method preserves the Colour best, and is done with least Trouble. A much better Method than this of the Oven, is the flattening and drying the Plant, by passing a common Smoothing-Iron, such as Women iron Clothes with, over the Papers, between which it is laid, and many Plants will be beautifully preserved this Way: But for nice Things, the most perfect of all Methods is, that by a common Sand-Heat, such as is used for chymical Purposes; the cold Sand is to be spread smooth on this Occasion, the Plant laid on it carefully flattened, and a thick Bed of Sand sifted over: the Fire is then to be made, and the whole Process carefully watched, till by a very gentle Heat the Plant is perfectly dried: The Colour of the tenderest Herb may be preserved in this Manner; and Flowers that will be preserved no Way else, may be managed perfectly well thus. It was by this Means that I dried the four Flowers of the great *Cereus* at the late Lord *Petre's*, three of which are now in the three first Collections abroad.

PART

PART I. BOOK II.

Of ARTS, the Principles of which are laid down in the PHILOSOPHICAL TRANSACTIONS.

CHAP. I.

A Method of making Ash-Trees.

THIS is a Process so extremely singular, that there seems in all the Histories we have of the Arts and Manufactures of antient and modern Times, to be but two recorded that are equal to it, or even of the same Kind : The one of these is *Virgil's* Method of producing Swarms of Bees ; and the other, the very renowned Sir *Kenelm Digby's* Process for making live Cray-Fish.

The first of these is directed to be done by killing a Bull, and exposing his mash'd Quarters to a proper Wind. The other by bruising some live Cray-fish to Pieces, calcining some other to Ashes, and putting them together into Water.

So creditable a Writer as *Pomet* tells us of an honest *French* Parson, who supposing *Virgil* an Author grave enough to be relied on, attempted his Process, and who, tho' he did not get any Bees, had like to have poisoned his whole Parish : And we have a very recent Instance of a grave Member of the *Royal Society*, who having heard from the oracular Mouth of the just now mentioned Mr. *Baker*, that there were so many strange Things daily found out, that a wise Man ought to think nothing impossible, paid the same Respect to Sir *Kenelm Digby*, that the *French* Parson did to *Virgil* ; procured a Quantity of Cray-Fish, bruised some to Pieces, calcined others, put them into a Vessel of Water, and followed all the Directions of that famous Knight of miraculous and lying Memory. An Accident gave him great Imagination of Success : It chanced that he made this Experiment in the Time of Frog Spawning, and some straggling Female of that Kind dropped her Burthen into his Cray-Fish Liquor.

Liquor. It was with Rapture that he first saw the Signs of Life in the Liquor, it was in vain to tell him his young Brood were not Cray-Fish but Tadpoles; he persisted in the Faith he paid to the Author of the Experiment, and by ill Luck, poisoning them with the Quantity of Blood he gave them, according to Sir *Kenelm's* Directions, to feed upon, they perished before they underwent the Change into Frogs; and the Experimenter will never be convinced but that the little black Things he found in his Liquor were young Cray-Fishes.

After doing the due Honour to perhaps the only two People in the World who could have given Credit to Accounts like that which is the more immediate Business of this Place, we come to lay down the Method of making Ash-Trees, as certain to succeed as that of the Bees or the Cray-Fishes, as well attested as to the Success it has had as either of the former, and much easier in the manner of proceeding in it.

The Experiment is recorded in the four hundred and thirteenth Number of the Transactions: The Author, or second-hand Author, for like many other of the wonderful Things commemorated in these wonderful Works, it comes to us thro' two Hands, is an unlucky Namesake of one of the best Metallurgists of the Age, *Cramer*. The Method is this. Cause a Number of Pipes to be bored of Ash-wood; bury them in the Earth for twelve Years, and let Water all that Time run thro' them; at the End of this Period take them up; let them lie above Ground and rot, and there will come up in their Places, to use the very societarian Phrase, little Forests of Ash-Trees where every Pipe has thus rotted. The Process is delivered in the Transactions in the most authentic of all Manners, by Example. We are not told that it may be done, but informed that it was done. This is not the only Instance the World has had of this Kind of Resurrection, this Phoenix-like Revivification of the Ash-Tree from its decayed Trunk; there has been another very parallel to it, the History of which may serve to explain this.

At the Time that the ingenious and eminent, but somewhat too precipitate Dr. *Lister*, was in the Height of his Reputation, there was observed near the Town of *Bugden*, a fine young Shoot of Ash, very vigorous and flourishing, growing out of the decayed Head of an old one, which had been dead and destitute of Bark in every Part for more than a dozen Years. It was at this Time that the Doctrine of all Trees being nourished by Juices carried up thro' their Bark was in its glory;

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the Doctor had been a great Assertor of it: He was informed of the Growth of this Tree without its Bark, as a Fact that disconcerted his whole System; he went to the Place, examined the Trunk of the Tree, found that there was indeed no Bark upon it, and sat down to write upon the contrary System to what he had just been so firmly supporting; luckily for his Credit, before he published his History of the *Bugden* Ash, which would otherwise have become as renowned in History as the Elm in the *Tuilleries*, some inquisitive Body or other got a Ladder, mounted the Tree, and found that it was indeed as dead as it had been long supposed to be, but that some Earth having by Accident lodged itself in a hollow formed in its Top, the Seeds of some other Ash-Tree had been blown, or by some other Accident carried thither, and had grown just as well as they would have done in any other Mould. The Doctor was a little mortified at the Discovery, and very peevishly threw his new Dissertation into the Fire, determining never afterwards to reason upon a Subject till he was sufficiently assured it was a fact: If the World had lost the Account of the other, Mr. *Cramer* would have lost no Reputation by it.

C H A P. II.

A new Way to make Pot-ash.

IT has been a Matter of very serious Enquiry for many Years in our *American* Colonies, how they should make so valuable a Commodity as Pot-ash: it is evident that they have Wood enough, and it is not easy to conceive that they want any thing but the Secret of the Operation to the getting Estates by it fast enough. Dr. *Mitchell* has lately published a Paper on the subject, which does not come under our Cognizance in this Place, but we find the Philosophical Transactions are not wanting in a Method long since laid down for the doing it, which is truly of a Piece with the rest of their Discoveries that have been the Subject of our Animadversions: a Method which we are not afraid to declare, is the easiest, cheapest, and every way the best of any yet laid down in any Part of the World, if People can but find the Way to make it succeed. It is no more than this: Take some rotten Wood, set it on fire in a common Chimney Hearth, and when it runs in the burning
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into Lumps and Cakes, take them out and pack them up in Barrels; they are Pot-ash without any further trouble. This most remarkable Process stands in the three hundred and sixty-sixth Number of the Philosophical Transactions; its Author is Mr. Robie. Methinks I hear some snarling Witling cry out as he reads the Process, *take out the Salt as it runs in the Burning! ay, that I will with my Fingers!* intimating that no Salt would be formed this way; but we are to inform such half Criticks that they are not acquainted with the *Royal Society*. Things, as contrary to Reason and Experience as this can be, are frequent in their Works; and this, like the rest, is not a dry Precept, but is supported by Example, and attested by the Experiment of the Man who gives it. He tells us, that he was present when a Tree, whose third Part was decayed and rotten, was burnt, and that this rotten Part, in the Burning, ran down into Lumps or Cakes of a fine, nay, and a white clean Alkali, or very fine Pot-ash. He assures us, that on tasting these Lumps, they were found to be very strongly saline, and on dissolving them in Water they produced, without Filtring or Decantation, only by the bare Evaporation of the Water, a Salt exceeding in Strength and Whiteness any to be met with at the Shops; these are the very Words of the Author. Nay, he not only asserts the Fact, but he argues upon it, and sets its Contradiction to Sense and Reason in the strongest Light; he tells us, that it was only the *rotten Part* of the Wood that yielded all this Salt, for the sound Part yielded no more than common Wood; that whereas all other Salts of this Kind are foul and blackish at first, this was originally *white and clean*. That the rotten Wood, instead of burning, *melted and cloddered together in great Lumps*, bubbling and boiling up with a hissing Noise, like that of Fat in a Pan over the Fire: and finally, what must encourage the People who believe in the Philosophical Transactions, to pursue the Plan beyond all other Considerations, that whereas the Pot-ash or Alkali produced from other Wood by burning, is in a very inconsiderable Proportion to the Wood employed, this affords nearly *an equal Weight of Salt* to the Wood that was burnt.

These are very tempting Circumstances for the setting People to work on making Pot-ash. Rotten Wood is plentiful enough in *America*, and is the cheapest and the easiest got of all Wood. Here is no Apparatus or Expence necessary; no calcining, no wasting, no dissolving, nor in short any more Trouble than the setting the Wood on fire,

and taking up the Salt that it produces ; for we do not find that it burns to Ashes at all. How amazing a thing it is, that the Philosophical Transactions of the *Royal Society of London* should be sunk into such Disrepute, that People should be seeking after Arts as unknown, that are described at large and reasoned upon in them : Either not reading these valuable Reservoirs of Knowledge, or what is worse, treating the easy Processes delivered there, with such Contempt as not to think them worth a Trial. To be serious ; there is nothing we more wish, than to see so rational and advantageous a Thing for our Colonies, as the making Pot-ash, set on foot among them ; but we cannot tell how to blame them, for the Neglect they have shewn this boasted easy Method. Whether the Author of it was weak enough to receive some such Story as this on Hearsay, and to report it to the *Society* as of his own Knowledge ; or whether, confident of the Share of Knowledge the *Royal Society* was endowed with, he, perceiving it to be false, bantered them with it, we presume not to say. Enough for the present Purpose however, we are able to determine, which is, that the whole Story is false ; that it is not the Nature of Wood, rotten or sound, or in whatever State, to *melt* in the Fire, and run into pure Salt instead of Ashes. That it is not possible that any Wood should yield its whole Weight, or nearly so, in Salt : And that of all the Wood in the World, that which is rotten yields the least Salt ; and consequently, that there can be no Truth in the Assertion of the rotten Part of this Wood yielding more than the sound. To this we may add, that all Salt produced by burning Wood in this Manner, must be foul ; and that a pure white Salt in Cakes, produced by the Process here described, is utterly impossible.

False and absurd however as this Account is, its Author, whose long Acquaintance with this learned *Society* could not but have taught him, that nothing was easier than to account for Impossibilities, after delivering the Fact, and stating all its particular Contradictions to Nature, Reason and Experiment in Form, proceeds to explain how it happened. He makes the nitrous Salts of the Air the great Agent, and goes a strange round-about Way to introduce them in such Quantity. We cannot descend quite so low as to enter into a Dispute against such Reasoning, as this Author's : It may be sufficient to observe, that other Trees are liable to all the Accidents to which that was exposed.

posed which furnished the Alkaline Salt he gives us this Account of ; and consequently, that if it were possible Wood should be so changed into Salt, something like it would have happened to some other Trees since that Time.

C H A P. III.

A Way to kill Lions.

EVERY Man who has travelled in the East, or who has read the Accounts published by People who have travelled there, must be sensible of the Dangers Men are continually exposed to on those Journeys from Lions and other Beasts of Prey. How ought the World to be sensible of its Obligations to the *Royal Society of London*, for discovering, among the many other useful and necessary Arts they have found out or improved, a Method of freeing Men from the Danger they are in on such Occasions, from those terrible Beasts. We venture to say Beasts, in the plural Number, tho' that Term somewhat exceeds our Warrant, it is only Lions that are mentioned in the Receipt ; but as the Lion is the King of Beasts, we suppose all might be probably enough included under that Word, and it appears so probable, that what will kill a Lion, will kill any other Beast also, that we shall not fear to assert, it will be as good a Safeguard from all the rest as from this terrible Species.

As with us, Men frequently travel with a Dog with them, by Way of Guard against any Animal of our Part of the World that might be troublesome ; a Porcupine is to be recommended to those People who travel the Eastern Deserts, as an Animal useful in the same Manner, against the Creatures of that part of the World.

How good, how excellently wise is Nature (as Dr. *Hughes* exclaims in his History of *Barbadoes*, on, nearly, a parallel Occasion) to have provided in every Country, for the Use of that Lord of the Creation, Man, such Creatures as will serve for his Defence against others that might be troublesome or hurtful to him ! We are not however to do the Philosophical Transactions alone the Honour of this most useful Discovery ; something is due to ourselves, as the Compilers. The Art itself is partly declared by an Author in the Transactions, partly by that *Pliny* of later Times *Aldrovandus*, in his History of Quadrupeds. This great Author tells us, that the Porcupine, tho' a very grim Creature to

look at, may be easily tamed, and brought to follow a Man about, and to understand every thing he bids him do; and the other great Author in the hundred and twenty-ninth Number of these celebrated Works, tells us, that this Creature, so easily tamed, is able to destroy Lions in an Instant: The very express Words he uses are, *Porcupines kill Lions, by darting their Quills into their Bodies*. What is more natural than from these two Accounts (the one of which we dare assert to be full as true as the other) to deduce, that there needs no more to be in Security from Lions and other Beasts of Prey, than to train a Pair of these Creatures, teach them to throw out a Quill at any thing that offends you, and then to march boldly into the Den of the Lion, if necessary, with this Champion, who is able to destroy him at a Blow. We ought not to omit mentioning, that the Place where the Porcupine is said to destroy the Lions in this Manner, is the Country of *Balsara*, a Country where, as the same accurate and faithful Writer, in other Papers printed in the same Transactions, informs us, Cobwebs catch Thrushes, and *Cows eat Fish*, where it takes *three hundred Seeds to raise one Plant*, and where Ants eat up Men alive. Such strange things do these Travellers see!

C H A P. IV.

A new Way to catch Eels.

FOOD is one of the immediate Necessaries of Life, and the Arts of obtaining the several Kinds of it deserve all possible Encouragement. The *Royal Society*, ever attentive to the good of its Country, we find have transplanted Arts tending to this Purpose from the most distant Parts of the Earth, nor are those at Home to be neglected.

The Foundation for the Art, the inculcating of which is the Business of this Paper, is delivered in the four hundred and eighty-second Number of the *Philosophical Transactions*; the Place which has the Honour to furnish the Hint, is *the City of Wonders*, or, as the Vulgar call it, *Norwich*; the only Place in the World proper to have furnished it; the Author, Mr. *Arderon*, the only Man in the World proper to have communicated it; and if we add to this, that it stands in the only Collection

lection in the World, in which it could properly have a Place, we flatter ourselves that the candid Reader will allow it has at least as much Propriety about it, as any Paper in the Transactions. The Method is this. Erect a Dam of Wood-work, across the Bed of a River, in which there are Eels; let it rise six Feet above the Level of the Water below, and be plained *as smooth as a common Plain can make it*; on the opposite Side, where the Water is to be raised, place a Row of convenient Vessels to receive what comes; look into them once or twice a Day, and you will have Plenty of Eels in them. Methinks I again hear some surly Critic exclaiming, but how are they to get there? Patience, violent Sir, and hear us out before you condemn us.

Mr. *Arderon* of *Norwich* describes just such a Dam as we are here describing, excepting only, that no-body having had the Wit in that Case to apply the Vessels we mention to receive the Eels, they all run away as fast as they come over. This Dam at *Norwich*, from which we take the Model of our intended Dams, was built for other Purposes, and consists of Flood-gates, serving the Purposes of certain Water-Works. The Gates and Posts of these, Mr. *Arderon* tells us, rise five or six Feet above the Surface of the Water, and yet, he assures us, that viewing them on the *twelfth Day of June, 1746*, he beheld *great Numbers of Eels* rising out of the Water, and climbing up the Posts and Gates to the Top, whence they threw themselves over into the Water on the other Side. This very accurate Author does not content himself with relating the plain Fact in this Manner; he assures us, that they not only were able to get up these Posts and Gates, but that they slid up them with the utmost *Facility and Readiness*, ascending directly upwards with as much Ease, to all Appearance, as if they had been sliding along *level Ground*. We are ready to acknowledge, in Honour to the bare Account, as delivered by Mr. *Arderon*, that it would not be difficult to find a Way of catching them as they climb up these Posts, notwithstanding they do it so nimbly and easily; but we cannot but observe, in Favour of ourselves, that our Proposal is certainly a more certain, as well as a more easy one, requiring less Trouble and Application, as it would be only necessary to take up the Vessels placed for the Reception of these Eels now and then, which might be done in a few Moments each Time.

As we are desirous of the utmost Precision in these Cases, however, and would by no Means lead our Readers into Error, we should be glad

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if that Gentleman would, in an Appendix to his Account, in some succeeding Number, be so kind as to inform the World, whether it is only on the twelfth of *June* annually that the Eels of *Norwich* are in this climbing Mood, or whether it happens at all times of the Year.

CHAP. V.

A Way to prevent Melon Plants from producing any Fruit.

THE Mischiefs that attend the eating of Fruit too largely, and especially such Fruits as are not the easiest in the World of Digestion, are well known: Physicians have said much upon the Subject, but like People of all Kinds who tell Truth, they have had the Fortune to be very little regarded. Melons are evidently of the Number of the Fruits included in this Censure, and as the Industry of our Gardeners has now brought them to so low a Price, that it is in the poorest People's Power to do themselves Mischief with them, it is a humane Office to explain to the World a Method of preventing all this Harm, which that great Source of all Knowledge, the *Royal Society*, has long since laid the Foundation for.

We have, in another Place in our Animadversions upon Mr. *Dudley's* Apple-Tree, observed, that all Fruits are produced by Means of a male Farina impregnating their Embryos. In some Plants these Embryos with the rest of the **Female** Parts of Generation are placed in the same Flower with the male Parts. In others they are placed apart in separate Flowers, growing on different Parts of the Plant from the Female ones, or those which contain only the female Parts of Generation. In others these female Flowers and the male Flowers grow on separate Plants of the same Species. The Melon is of the Number of those which have the male and female Flowers on different Parts of the same Plant; the Flowers containing only the male Parts, growing on one Part, and those containing only the female Parts on another. It is a very natural and easy Observation, that, of the Number of Flowers on this Plant, some only produce Fruit, others not: It is easy also to **distin-**
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guish the fruiting Flowers from the others by the Parts contained in them. Every Gardener is able to do this at this Time; and in order to the preventing the Plants from producing any of these mischievous Fruit, there requires no more than carefully to pick off these male Flowers as soon as they appear; the Consequence of which will be, that there can no Fruit succeed, unless Dr. *Abraham Johnson's* Scheme for impregnating Women by the Wind; or Mr. *Dudley's*, of impregnating Apple Trees, by the same or some such Means, should unluckily take effect on them.

This is an Art not laid down positively and punctually in this Form in the Transactions, but as it is evidently deducible from Precepts delivered there, we could not fail to give it a Place among the useful Arts for which the World is indebted to the Discoveries made by the *Royal Society*; we are obliged to Mr. *Phillip Miller* of *Chelsea*, for the Light the Transactions let into this Affair. The Candour and Modesty of that Gentleman will not indeed permit him to take the Discovery upon himself, but he very fairly gives it to an anonymous Person of his Acquaintance, whom, tho' he does not favour us with the Name of, he distinguishes by very judiciously prefixing the Epithet *ingenious* to his Mention of him.

The Gardeners had been long used to call those Flowers of the Melon and other the like Plants, which did not produce a Fruit to succeed them, by the opprobrious Names of *false Flowers*: Mr. *Miller* acknowledges that in the memorable Experiment which gives Rise to this noble Art, he meant exactly the contrary of what happened; but Facts will be of Use with whatever Intent they are produced. He was informed by this *ingenious* Friend, that these false Flowers were of no use to the Plant, and only served to draw the Nourishment from the true Blossoms and from the Fruit; and that if he pulled them off as soon as they appeared, his Fruit would be much the larger and the finer for it. The ingenious Mr. *Miller* took the Advice of his ingenious Friend; and what was the Event? Why, not that his Melons were, as he expected, larger, but, that he had no Melons at all. The Success this Experiment had, contrary to the Expectation of the Person who made it, is a full Proof of the Certainty of the Event of our proposed Art; and by this we see how little People, who make Experiments, can be sensible of the Effects the Events of them will one day have. To give the curious Gardener, who may be willing to bring this our Art into Execution, the better Opinion of the Affirmations it is founded upon, we shall not only join

our Assurance of the Success of it, but add, that in all Experiments commemorated by the *Royal Society*, the Event may be depended upon when it falls counter to the Intent and Meaning of the Experimenter; tho' our Faith ought to be of a much more limited Kind in regard to those Experiments, the Events of which tend to prove the Theories they were established in favour of.

If any Man should tell us, that after all these Encomiums on this Art, the pulling up the Plants, or the not sowing them at all, would answer the same Purpose as well, we are not in a Humour to deny it; but if the Reader will be pleased to look upon the societarian Method of killing Rattle-snakes, &c. &c. &c. he will find this to be exactly of a Piece with them, and that we could not in doing Justice to the Society omit the mention of it.

CHAP. VIII.

A Way to poison a Bath; and a History of a subterranean Fly.

IN all Books that treat of the Arts in general, the Methods of doing hurt are delivered, as well as those of doing good: The chymical Writers teach us how to prepare Poisons, as well as Medicines for the restoring of Health; and in the same Manner, the Philosophical Transactions, that give us many Processes for the doing good, are not without some, for the sole Purpose of doing Mischief; of these, the great Secret that makes the Business of our present Consideration, is an Instance; and if we may judge of the mischievous ones by this, it will be easy to conclude, that they are to the full as likely to execute what is intended by them, as the good ones.

The Author, who communicates this, is the frequently to be celebrated Mr. *Glanvill*. It stands in the forty-ninth Number of the Transactions: The Method is this, Let a Woman wash her Hair with a Mixture of beaten Eggs and Oatmeal, and go afterwards into a warm Bath, and she will poison the Water to such a Degree, that there will be a stinking noisome Smell communicated to it, and a great Quantity of a light and frothy Sea Green Matter will swim on it; the whole Body of the

the Water will also partake of this Colour, and it will taint the very Walls, tinging them green and making them stink.

One would wonder how so odd a Process as this came ever to be found out: it is certainly beyond the reach of Reason or Philosophy to have arrived at, as there is nothing to lead to it: Probably like all other great Discoveries it was owing to Accident: Neither Oatmeal nor Eggs have any bad Smell, unless People chuse to use the latter when they are rotten, which does not seem very likely, any more than that they should ever chuse to *wash their Hair* with so odd a Mixture at all.

The Author tells us, that the Observation was made at the Cross Bath, in the Town of *Bath*; and he unluckily observes soon after, that the Water of this Bath is apt, in Summer, to cast up a great Scum; he might have added, and to smell somewhat like rotten Eggs, which is the Case with all those Waters, when a long dry Season has rendered them stronger than they are at other Times. We would venture considerable Odds, that the Observation the Author mentions, was made at this time of the Year, and that the Water coming up stronger and fouler than ordinary, and the Heat helping it in fouling the Walls, the good old Women of the Place, attributed the Mischief to some wicked Creature of their own Sex; and the good old Woman of an Author received it as Gospel from them; and as such communicated it to the good old Women of the *Royal Society*.

Another Account the Author gives the same Society, which indeed he professedly quotes those good Women for; this is of the subterraneous Generation of a certain Fly with scaly Wings, which darts very swiftly in the Water, and is only found in it in the Summer Months; it lives under Water, he tells us, and sometimes bites People; and he assures us, that the Guides assure him, that it comes up with the Springs, and is found no where else.

This strange and wonderful Fly is still too common in the Place this Author mentions, at the proper Season; but it is also common at the same Time of the Year in every Ditch within a hundred Mile of it. It is the *Notonecta* or Boat Fly: It has a long Proboscis, which it will sometimes strike into the Flesh of People in the Water, but the Wound is attended with no other Mischief, than a Minute or two of very severe Pain.

C H A P. VII.

A new Method of learning to sing.

T H E R E is not any of the polite Arts or Accomplishments that the *Royal Society* of *London* hold below their Notice; we have occasionally a Number of Informations and Instructions on these Heads dispersed thro' their Works: The Subject of our present Panegyrick stands so late as in the four hundred and eighty-fourth Number of the *Transactions*. The World is indebted to the very reverend Dr. *Doddridge* for the Discovery, and to the very judicious Mr. *Baker* for making its Way into the World by introducing it at the *Royal Society*, and procuring it a Place in the Publications of that Body.

The good Doctor, who is eminent on other Occasions for inculcating his Precepts under the Form of Example, tells the World in this Paper, that a Lady in a Frenzy after a Lying-in, found such an Alteration in the State and Tone of her Nerves, that whereas she never before had any Ear for Musick, nor any Voice, she was then capable of singing most amazingly, justly, and elegantly, a great many fine Pieces of Musick, which her Sister had learned some Time before, tho' she at that time paid no regard to them.

The Doctor goes into the Particulars of the History so far as to tell us, that the Lady was married; that her Husband was a Brother of the Gown, and a Man of Eminence; and that her Frenzy was afterwards cured; with many other Particulars very necessary to the Story, and for which we refer to the *Transactions* at large.

We would not pay so ill a Compliment to the Doctor's Veracity, or his Understanding, as to suppose he related this as a Fact, or believed it to be so; if we imagined that he intended it to be received as such, and even to give himself as one of the People who were Witnesses to it, we should be apt to conclude from it, that he had no more Ear for Musick than the Lady had; but there is no reason to suppose that he meant any such thing: He does not so much as say that any such thing really happened, he does not affirm that this identical Lady ever did sing any Tune at all; he only says, she was capable of doing it, as People are of doing a thousand Things that they never did, nor ever will do. It is very evident

evident, that the Doctor has a musical Head, and he has devised this short Method of teaching so necessary an Accomplishment to the young People of his Neighbourhood. We are very sorry it proves of so limited a Kind, as to be only practicable by the female Sex, and not by them but after a Lying-in: It is somewhat unlucky, that the Accomplishment is on this Plan to be acquired only after the Ladies have got them Husbands, whereas the great Intent of Teaching it at present is the procuring them those necessary Evils. If the Doctor will find a Way to connect this easy Method of learning to sing as intimately with the being the Father of a Child, as he has with the being the Mother of one, we are apt to believe he will find it easy to have a Number of Pupils. As to the natural Impossibility, it is evidently no greater in one Case than in the other, and we are not without Hopes that the Author will profit himself of the Hint and bring it into Practice.

It may not be amiss to observe, in regard to the Writings of this reverend Author in general, that we do not intend to extend this Allegorical Meaning to them all: His Account of a Lamb with two Heads, and another Creature of the same Kind sucking a Weather, we suppose have no Meaning but the obvious one.

evident, that the Doctor has a rational Head, and he has devised this
 short Method of teaching to necessity, an Accomplishment to the young
 People of his Neighbourhood. We are very sorry it is not of a limit-
 ed Kind, as to the only person, by the female Sex, and not by them
 but by a young man; it is somewhat unlucky, that the Accomplish-
 ment is on this Plan to be acquired only after the Ladies have got to em-
 broider, whereas the great intent of Teaching is at present in the pro-
 curing them those necessary Skills. If the Doctor will find a Way to
 connect this easy Method of learning to the study of the Latin
 the Father of a Child, as he has with the Latin the Mother of the
 are apt to believe he will find it easy to have a number of Topics, as
 to the natural Impulsibility, it is evidently no greater in one than
 in the other, and we are not without hopes that the Author will profit
 himself of the hint and bring it into Practice.

It may not be easy to observe, in regard to the design of this re-
 vended Author to teach, that we are not intended to teach the
 great Meaning to them, but the Account of it, and we are to
 and another Course of the same Kind, but in a different way, we suppose
 have no meaning but to teach them to read, and to write.

ANTIQUITIES

PART II.

TRANSLATIONS OF THE ROMAN SOCIETY.

PART II.

OF

ANTIQUITIES.

THE Members of this illustrious Society would perhaps have been larger on this Head, if they had intended to have set themselves up as Rivals to a certain other Society; an Event which perhaps nothing could have frustrated but the judicious Contrivance of making the same People Members of both.

PART II.

Of ANTIQUITIES commemorated in the Transactions of the ROYAL SOCIETY.

CHAP. I.

An Account of an Antediluvian Knife.

THO' the Works of Nature are the proper Objects of the Disquisition of that celebrated Body whose Works we are commenting upon, they have not denied their Attention to the more remarkable ones of Art, when either the Singularity of their Structure, or some other particular Circumstance relating to them, has recommended them to their Inspection. Antiquity has been ever one of the greatest Pleas on these Occasions; and this could never be of greater Force, than in regard to the little Utensil that is the Subject of this Paper: Who could wish to trace Antiquity farther back than to the Antediluvian Ages; and who would not wish to be informed of the Shape and Structure of Knives, at a Time, when one of the nicest Operations, in which a Knife could be requisite, that of Circumcision, was performed, as that obsolete Book the Bible tells us, with a *sharp Stone*.

Had all these Reasons availed nothing, however, with the Author, there is evidently another that would have prevailed with him to publish the Account; his Fondness of an Opportunity to shew his Poetry. This is a Science the Members of the *Royal Society* have at all Times been famous for; we have a very recent Instance of it in Mr. *Baker*, a Gentleman as truly eminent in Poetry as in Philosophy, and as eager to shew his Talents in the one as in the other; a very happy Instance of which, we have in his Dissertation on the *Gramen Tremulum*, in which the most prejudiced Reader cannot but acknowledge,

ledge, that his Poetry is as good as his Philosophy, and his Philosophy as his Poetry. We are sorry to conjure up from the Abyſs of the earlier Tranſactions, a Rival to this great Author, who ſeems to have claimed the Praise of both the Sciences to himſelf alone in that memorable Paper: But Impartiality is the firſt Principle we ſet out with, and be the Conſequence what it will, Truth muſt appear. We ſhall only ſtate this Gentleman's Reasoning and his Poetry in a fair Light, and leave the unlucky Compariſon to the Reader.

The Account is given in a Paper of Mr. *de la Pryme*, published in the two hundred and ſeventy-fifth Number, in which he proves many of the Trees now found under Ground in our Moraffes, to have been owing to the cutting down our Foreſts by the *Romans*; and in this he very judiciously introduces this Story of Mr. *Canby*, of a Knife, which he found in one of theſe very Moraffes, and which he is very certain is of Antediluvian Origin, becauſe ſome *Roman* Tools, and ſeveral Coins of the Emperor *Vespasian*, were found in the ſame Place. The Haſt, he tells us, was made of very hard black Wood, with a Cap of Copper or Braſs at the one End, and a Ring of the ſame Metal at the other. The Blade, he ſays, was mouldring away, ſo that he got another put into it, on which he cauſed to be inſcribed theſe truly *Bakerian* Lines;

*Ever ſince No's Flood was I left,
My old Blade is conſum'd, but this is the Haſt.*

The Author unluckily has forgot to inform us what Metal the old Blade was made of: As to the Wood of the Haſt, he might have been aſſured, that whatever Colour it was of when made, it would be very ſure to be black when he found it, without going back to the Antediluvian World for the Time of its being buried there.

C H A P. II.

Proofs that the City of Norwich was once a Sea Port.

IT is not without Reason, that *Norwich* has, ſince the Days of Mr. *Arderon*, been called *the City of Wonders*; if we examine that great Collection of Miracles, the Tranſactions of the *Royal Society*, published ſince

since the Time when the sage Mr. *Arderon*, under the Patronage of the equally sage Mr. *Baker*, became a Correspondent of that Body; we shall find more than ten Times as many strange and wonderful Events dated from this City, as from any City of the World.

It was Time, after having recorded in these immortal Works, the several Miracles, Discoveries, and Improvements of this City and its Inhabitants, to say something of the Place, that it might not be famous only for what it produced, but have some Share in the Renown itself. The strangest Things that can be devised, are of all others the fittest for the Entertainment of the *Royal Society*. Mr. *Arderon*, perfectly informed by Mr. *Baker* of this Turn in the Body he was to oblige, and by obliging whom alone, the Place of his Nativity could be exalted to the Honour he aspired to raise it to, sets out with telling them, that tho' an inland Town at present, he is convinced it was once a famous Sea-Port; and that as to the Time of its becoming otherwise, he is of Opinion, that it was *when the German Ocean broke its Way thro' the famous Isthmus, which once joined England to France*; at which Time he quotes *Verstegan* to prove, that many Places which had before been Sea, became dry Land. This is his first Argument for *Norwich* having been once a Sea-Port.

His second is of a very different Kind; he observes, that there are Hills near *Norwich*; that in those Hills there is Marle or rather Chalk, (so he expresses himself) and that in this Marle there are buried a *great Quantity of Sea-Shells*; these, he tells us, lie level with many Parts of the Ground in *Norwich*; And this, he observes, whatever his former Argument might do, seems to put the Matter out of all Dispute, and prove that *Norwich* was once a Sea-Port; tho' he acknowledges, that both the Shells and the Ground on which *Norwich* stands, is at present about a hundred and two Feet above the Surface of the Sea.

His third Reason is, that six or seven Yards below the *Stratum* of Shells, there are found vast Quantities of *Stags Horns, of a great Size*.

Such are this Gentleman's Arguments, alledged in Proof of so remarkable a Fact, the Credit and Force of which seem much upon an Equality with the rest of the very numerous Works of the same Author, which stand in the same honourable Company. As to the Fact of there having once been such an *Isthmus* as he depends upon for the Means of the Catastrophe which has robbed *Norwich* of the Sea that

used to kiss its Toe, we shall leave it to *Verstegan* and him to prove. It will answer all our Purposes, to observe, that whatever may appear to be the natural Consequence of the breaking of the Sea thro' it, to him and to the *Royal Society*, we are assured, that such an Accident, if it ever had happened, could neither have sunk the Sea about *Norwich* a hundred Feet perpendicular, nor have raised *Norwich* a hundred Feet out of the Sea. Which of these two Circumstances, the Author supposes, really to have happened, we are unhappily left in the Dark; but as to the Fact, it is clear enough that while Water was fluid, no such wonderful Event could have been the Consequence of such a Rupture, of a Neck of Land joining an Island of the Size of *England*, every Way else surrounded by it.

As to his second Argument, that Shells are found in the Hills near *Norwich*, and therefore, that the Sea must once have been there, and the Town a Sea-Port; we perfectly agree with him, that it is a Proof that Sea Water once covered the Ground there; but we are apt to suspect, that this happened some Time before *Norwich* was built. We are told, in a Book that most People are fond of being thought to give some sort of Credit to, that there was a Time when the Water covered the Tops of the highest Mountains: And we have Proofs in those very Mountains, of the Truth of the History; as Sea-Shells are at this Time found buried in the Earth at the greatest Heights on them.

Mr. *Arderon* tells us of Dr. *Leigh's* foolishly affirming something that might make against his System: It is a Term that might have been spared between Mr. *Arderon* and Dr. *Leigh*; tho' the latter should have been in the Wrong, and the former should have been told so: He speaks about as civilly and modestly also of Dr. *Woodward* for his System, tho' it is from this very Author alone, that he had learned to laugh at the other; and continues firm in his own Opinion, that the Shells being found in these Hills, are a Proof of the Town near them having been a Sea-Port. In Contradiction to these foolish Authors, let us advance a little farther upon the wise Mr. *Arderon's* Principle: We find Fossil, Cockle, and Oister-Shells in vast Abundance near *Warwick*, and that in *Strata* level with many of the Streets of that Town: What then can be more evident, than that *Warwick* was once a Sea-Port: *Oxford* affords in its Neighbourhood abundance of Bivalves, as well as turbinated Shells; and Echinites (except about *Norwich*) are no where so plentiful as near *Stafford*; What can be more evident, therefore, than that

that *Oxford* and *Stafford*, as well as *Warwick* and *Norwich*, were Sea-Ports, at the Time of the breaking of this Isthmus : Nay, let us carry it a little farther : Examine the *Strata* throughout the greater Part of this Kingdom, and the Remains of Sea Productions are found in them ; we appeal then to Mr. *Arderon*, therefore, if any thing can be more evident, than that the whole Island was one great Sea-Port, before the Time of the breaking of this memorable *Isthmus*, which, therefore, joined in this Manner two Seas that were but one before. This Gentleman must not take it amiss, that in commenting upon his Paper we take up his Manner of Reasoning ; it is a Trick the discerning Reader will catch us at on many other Occasions ; excepting always the Papers of the Patron of this *Norfolk* Genius, whose Manner of Reasoning we shall also attempt, if at any Time we meet with a Paper of his, in which we can discover any Manner of Reasoning at all.

To see, however, how far this great Discovery of Mr. *Arderon's* may be carried, let us peep from our own Doors into others the most distant Parts of the World : Our own private Collection furnishes Instances of *Fossil Pectunculi* from *Ispahan*, *Pectines* from *Milan*, *Gryphites* from *Neustat*, and *Echinites* from *Grenoble*. Nay, the very Top of *Carmel* furnishes us with abundance of *Lapides Judaici*, which are not petrified Olives, as Mr. *Arderon* was once of Opinion, before the despised *Woodward* had taught him otherwise ; but the evident Remains of a Sea Animal. The *Alps* and *Pyrenæan* Mountains also afford abundance of *Dentalia* ; and we do not know of a Mountain in the World, in which there have been tolerable Opportunities of enquiring, where Remains of Sea Animals have not been found. What is more undeniable then, on the sagacious Mr. *Arderon's* Plan, than that the whole Globe of the Earth was once a Sea-Port as well as the City of *Norwich*.

Let us not condemn him, however, without the fairest Hearing ; let us connect his second and his third Arguments together. From the first, of Shells being found on a Level with the Streets of *Norwich*, he seems to infer, that they once lived quietly there ; and that, therefore, *Norwich*, which now stands so near them, was a Sea-Port. His Argument is this ; these Creatures are Inhabitants of the Sea, and therefore the Sea must have been where they are : And he adds, Stags Horns are also found there ; from which we hope he means to infer, that Stags were once Inhabitants of the Waters, and lived there too ; else it does not

seem that he means any thing at all by it. Now, if he will prove to us, that Stags are, or ever were Water Animals, we believe we may venture to allow him all the rest.

We are not to omit, however, tho' this Gentleman has happened not to hit upon it, that the Situation of these Horns in the Earth, seems to point out a very different Origin of them, according to the Societarian Authors: Whoever will look back into the earlier Works of this most wise and judicious Body, will find frequent Mention of a terrible Monster called the Mammouth, a Quadruped of enormous Size, that lives under Ground, and hollows himself out Paths and Caverns in the Mountains; we are not told, indeed, that this Creature has Horns like a Stag, otherwise there would remain little Room to doubt, but that these Horns belonged to some of this Species, who had in this Place carried on their Burrows under the very Bed of the Ocean; for Mr. *Arderon* tells us, they lie six or seven Yards under the *Strata* of Shells: in short, there requires nothing to the convincing all the World, that these Horns belonged to this subterranean Quadruped, but the proving that such a Creature once existed.

In the mean Time, however, as this great Author frankly confesses, that it is beyond his utmost Endeavours to find out a Reason for their being there; perhaps it may not be amiss to give him one. In the first Place then, we are to inform him, that they are neither the Remains of a submarine nor of a subterranean Creature, nor (which is somewhat more surprizing) of any Creature that is at this Time an Inhabitant of this Island. They belong, like those found in many other Parts of this Island, to an *American Deer*; and tho' frequently found Fossil, have not yet been met with any where, except at considerable Depths.

That in like Manner the Shells, found in the Stratum he mentions, as we find by the Accounts of Enquirers of another Kind than Mr. *Arderon*, are many of them such as are not found any where in our Seas; but that like the *Nautilus*'s frequent in our Clay-Pits about *London*, tho' Natives only of the *Archipelago*, they are such as must have been brought from elsewhere, to the Place where they now lie, instead of having, as he imagines, once lived there; and finally, that the vast Clusters of Horns found together, not only in this Pit, but in all the other Parts of *England* where any have been found at all, evince, that they were not left by the Animals they belonged to in the Places where they are now found, but have by some Means been brought together there. If Mr. *Arderon* has

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Understanding enough to receive Conviction from this, that Matters are not at all as he stated them, nor these the native Places of the Shells he finds there, he will find his Opinion of *Norwich* having been once a Sea-Port, to be about as well established on his Arguments, as the Systems of his Brother Societarians usually are.

As to the Fact, of Shells being found in every Part of the World as well as about *Norwich*, it is indisputable; it is equally certain, that wherever they are found, Water must have at one Time overflowed, since there is no other possible Means of their being brought there; and since they are found in every Part of the Earth, the Tops of the highest Mountains not excepted, that overflowing of Water must have been universal; and the Earth which now forms the Tops of those Mountains, must, as well as every other Part of the Globe, have been covered by it. The Force of so immense a Body of Water must have been sufficient to carry every Thing that was loose along with it, and that to any Distance: The Horns of Deer, are Things as likely, from their Figure, to entangle with one another, as any Thing one can conceive, and they might be left in any Place where the Motion of the Waters chanced to abate: They might subside about *Norwich*, as well as any where else; a *Stratum* of Earth might be formed below, about, and over them, by loose earthy Matter suspended in, and now subsiding from the same Fluid which brought them thither; and after all this, a succeeding Body of Water from the same great Scource, might bring the Shells he mentions, and lodge them upon the new formed *Stratum*; after which, fresh earthy or chalky Matter might subside upon them, and form the covering of Earth that has preserved them to this Time, and will preserve them much longer, where they are not exposed to the Air by Digging.

Understanding enough to receive Conviction from this, that Matters are not at all as he stated them, nor that the native Places of the Shells he finds there, he will find his Opinion of Norway having been once a Sea-Port, to be about as well established on his Arguments, as the System of his Doctor Societarians usually are.

As to the Part, of Shells being found in every Part of the World as well as about Norway, it is indubitable; it is equally certain, that wherever they are found, Water must have at one Time overflowed, since there is no other possible Means of their being brought there; and since they are found in every Part of the Earth, the Tops of the highest Mountains not excepted, that overflowing of Water must have been universal; and the Earth which now forms the Tops of these Mountains, as well as every other Part of the Globe, have been covered by it. The Force of to inundate a Body of Water must have been sufficient to carry every Thing that was load along with it, and that to any Distance: The Horses of Deceit, are Things as likely, from their Figure, to congregate with one another, as any Thing one can conceive, and they might be left in any Place where the Motion of the Waters changed to retire: They might tumble about Norway, as well as any where else; a Stream of Earth might be formed below, about, and over them, by some early Matter subsided in, and now subsiding from the same Fluid, which brought them thither; and after all this, a succeeding Body of Water from the same great Source, might bring the Shells to the same place, and lodge them upon the new formed Stream; after which, the earthy or chalky Matter might subside upon them, and form the covering of Earth that has preserved them to this Time, and will preserve them much longer, where they are not exposed to the Air by Digging.

PART III.

OF MEDICAL CASES, detailed in the
TRANSACTIONS OF THE ROYAL SOCIETY.

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MEDICAL CASES.

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MEDICAL CASES

PART III.
OF MEDICAL CASES, described in the
TRANSACTIONS of the *Royal Society*.

CHAP. I.

Of Worms in the human Bladder.

INNUMERABLE almost have been the Authors who have written of the Worms in the Intestines, and we have not had a few who have given us Accounts of other Monsters there, some with two Heads, some with never a one; some with four Legs, some with six, and some with fifty; Monsters which whoever will believe their Accounts must suppose were created only to plague and torment us, since they are like nothing else in the animal World, and have Weapons assigned them fit for no other Purposes; and which would go a great Way toward the bringing equivocal Generation into Credit again, as nothing is more certain than that there have been no parent Animals like them. A very great Author in this Way, Dr. *Tanner*, a Gentleman whose great Modesty makes him conceal his Name, and has prevented him from becoming hitherto a Member of the *Royal Society*, tho' every Way qualified to make a good and useful Member of that Body, gives us at the End of every News Paper, along with an Account of his Penny Pills for destroying these noxious Vermin, a great Number of very curious Figures of this Kind; but all this is nothing to the Discovery of his great Rival in the creating Art, Dr. *Turner*, who not only excels this Daily Advertiser, but every Miracle-making *German* of the Ephemerides. These People, fond of crowding more and more Wonders on the World, have racked their Brains to find out new Figures of Animals only, but Dr. *Turner* has found out a new Place for them; and is the only Author upon the List of Transaction Writers that has introduced

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duced the Knowledge of their inhabiting the Urinary Bladder, as well as the Intestines.

The Doctor not expecting to be believed, in Regard to so wonderful a Thing upon his own single Evidence, produces two Cases of this Kind, which, to the immortal Honour of the Philosophical Transactions, are recorded in the three hundred and ninety-first Number of them.

The one is of a Woman who had voided, by the Urinary Passages, a Maggot with a crusty red Galea over the Head, and with a forked Tail. This Miracle however we have no better Authority for, than that the Woman shewed the Doctor the Maggot, and told him the History of it. It is very possible that the Story might be a known Falsity; and not less possible, that if the Woman who told it him believed it to be true, her whole Grounds for believing it so might be the finding this Animal in the Pot after making Water, in which Case it might perhaps have been there unobserved before, or if not, might have been voided the other Way. The Hexapode Worms of some of the Beetle Kind, particularly the common Meal-Worm, have been voided by Stool by many People, and Dr. *Turner's* Judgment, supposing this to have been the Case, does not seem to have been so very accurate, but that he might possibly have mistaken a Hexapode for a common Maggot.

The Doctor, as if conscious that this Relation was liable to be disputed, prefixes to it another at least as wonderful, but of which he pretends to have a considerably more circumstantial Account. He tells us of a Child of sixteen Months old, brought to him for Advice, which had for many Days laboured under violent Complaints, mistaken for Convulsions, and with a Difficulty of voiding the Urine. The Apothecary, he tells us, on visiting the Child one Day, observed an extraneous Matter at the Aperture of the Urethra, which he took hold of with a proper Instrument and extracted without Difficulty; when he had got it out, he found it to be a Worm, which with great Surprize he carried to the Doctor, who tells us that he examined and measured it carefully, and that it was a Worm of the same Kind with the common ones of the Intestines, usually voided by Children by the Anus, and was four Inches long, perfectly like an Earth-worm, and of a white Colour. The Doctor tells us, that having directed *proper Medicines* (we hope they were proper to destroy Worms in the Bladder) he examined all the Particulars of the Relation with the utmost Accuracy, and found that the Worm had
shewn.

shewn itself double at the Aperture of the Urethra, and had been extracted without Pain. We should have been vastly obliged to him if he would have given us as punctual an Account of the Way this Worm got into the Bladder as he has of that by which it got out.

We had like to have called this an Instance of Sagacity in an Author not to be equalled; but the Philosophical Transactions will have no Absurdity unparalleled, nor do the most ingenious Men, when they write for their Transactions, seem to care to get out of the common Road of the rest. We find in the hundred and first Number, an Account of about two hundred round Stones taken out of the urinary Bladder of an Ox; Dr. *Johnson* gives the Account of them, and tho' we are told that they were soluble in *Aqua fortis*, and composed of a brown stony Matter covered with a pearly Crust, yet Dr. *Lister*, who was of the Number of those who examined them, declares that till he had read *Wedelius* on Stones found in the different Parts of Animals, he took them to be Eggs of Insects.

CH A P. II.

Of a Boy who eat immoderately.

EVERY thing that is strange is the Business of the *Royal Society*; every Case in Physick appears strange to a Man who has had very little Practice in it; and if we add to this, that every Physician who has little Practice, imagines that the making himself known by means of the Philosophical Transactions, is the Way to have more, we shall wonder that there are not more medical Cases published there, rather than that there are so many. What Physician who is in considerable Business, or who but attends an Hospital, could not, if he thought it worth while, furnish a whole Transaction a Month filled with such Accounts?

We give this casual Hint by way of putting People in mind that nobody wishes to see medical Cases there, unless they be very singular ones indeed, and such as may convey some Knowledge to medical People themselves, which they had not before: what we have to add in regard to the present Subject of our Animadversions, which stands so late as in the three hundred and sixty-eighth Number of the Transactions, is,

that, when such Cases are printed in those Works, we would always wish them to be printed as this is ; that is, to be printed in such Manner as to express, that their Authors know as little of their Professions as other Authors in the same Works do in theirs.

The Business of this Paper is to inform us, that a Boy eat a great deal. We are very carefully informed of the Quantity of Beef, Pudding and Apple-Pye that he swallowed ; this was the Miracle to be related, and this the Authors have not failed in ; they have told us, however, to the no little Abatement of the Miracle, that the poor Creature vomited up every thing he swallowed, almost as soon as it was down : For our own Parts, we should not have thought it a Thing of any Consequence to be so exact in the Quantity of Food swallowed, by a Person whose Appetite was continual, and who kept nothing upon his Stomach, it might be almost whatever could be provided for him, but we could wish to see Physicians call things by their right Names, and not tell the World in Capitals, that they do not know the Distinctions of the Business of their own Profession : There are scarce less than three Doctors concerned in this wonderful Paper ; one who writes it, one who communicates it, and one who has the Care of printing it ; and yet we see this Case, in which the Patient vomitted up all he had eat, and had a continual Desire for more, which he immediately threw up again in the same Manner, called a *Bulimy* ; as this Name of the Disease stands only in the Title, perhaps the Author of the Paper will disclaim it, and leave the Secretary to the *Royal Society*, who sometimes has the Office of giving Names to the Children he sends forth into the World, to answer for it ; be this as they can settle it among them, all that we have to observe is, that a *Canine Appetite* and a *Bulimy*, tho' these Gentlemen seem to suppose them only the same Disease under two Names, are two very different ones ; different in the Causes, Symptoms, and Consequences. It is not our Business to enter into medical Disquisitions here, but we may in a few Words remind those Gentlemen, that there is one very obvious Distinction between them, which is, that in the *Canine Appetite* the Food swallowed is vomitted up again, in the *Bulimy* it is not. *In appetitu Canino revomuntur Cibi, in Bulimo nullus fit vomitus*, are the Words of all the accurate Writers on Diseases, and yet these Authors, when they are telling us that the Boy vomited all he eat, call the Case a *Bulimy*.

C H A P. III.

An easy Way of taking a Vomit.

THE World is obliged to the very learned and ingenious Dr. *Mather* for this curious and useful Discovery. The Doctor indeed unluckily gives us an Example instead of the Rule ; but as all Rules are deduced from Example, we have the Ground-Work to go upon, and it is our own Fault if we do not make out the rest. It is only necessary to the Success of the Prescription, that the Person be married, in which Case, as Man and Wife are one Flesh, one of them may at any Time take the Medicine in order to its Operation on the other. The Author assures us, that the Wife of a Gentleman of his Acquaintance would vomit very regularly and easily, on seeing her Husband take an emetick Draught, and that the Dose being not sufficient to work on two People, the Husband in this Case was not all affected by it ; but if it was on his own Account that he took it, he found it necessary to take another.

C H A P. IV.

A Dissertation on the Plica Polonica.

WE have been obliged in the Course of this Work to take Notice of many of the Papers of the Philosophical Transactions, in which the Authors have given very wrong Accounts of the Subjects they treat of : We produce this, as an Instance of a very different Kind, a Paper in which there is no Error in regard to the Subject ; and would propose it as a Model to all succeeding Writers of Memoirs of the *Royal Society* : The Imitation is easy, and the Success certain : The whole Secret of avoiding speaking erroneously on the Thing to be treated of, is to say nothing about it.

The Paper we would propose as a Model on this Occasion, stands in the four hundred and eighty-third Number, and is written by Mr. *Joseph Ames*, Fellow of the *Royal Society*, and Secretary to the Society of Antiquaries,

Antiquaries, *London*. This Gentleman had shewn to the *Royal Society* the matted Hair of a Woman, which had grown to the Length of one hundred and nine Inches : The Society had thanked him for the Sight, and solicited his Opinion as to the Subject. On the Day of their next Meeting he produced a very particular Dissertation on it ; in this he very punctually informed them, that the Woman to whom it belonged, was of a genteel Family, that she lived in *Staffordshire*, and had suffered in the Civil Wars; that her Mother's maiden Name was *Alice Goldsmith*, but her own maiden Name was *Hannah Banby*, that she was born in *White-chapel*, and baptized at *Aldgate Church*, that she had had four Husbands, the first of which was *Nicholas Woodcock*, but her Name was now *Hannah Cromes*.

This, Sir, is Mr. *Ames's* Dissertation on the *Plica Polonica*, addressed to Dr. *Mortimer*, read at the *Royal Society's* next Meeting, received with their Applause, and printed in their Transactions.

CHAP. V.

A miraculous Cure for fresh Wounds.

THIS is a Remedy taken from the vegetable World; it is published in the hundred and seventeenth Number of the Philosophical Transactions, and the World is obliged to that ever memorable Knight Sir *George Mackenzie* for it. It was discovered to him in the Way of most of the old Physick of the World, according to some Authors, that is, by the Brutes. The Plant is the *Lancashire Asphodell*, the *Asphodelus Lancastriae Verus* of *Johnson*, as Sir *George* says, tho' he tells us it grows in Forests, and *Johnson* makes it an Inhabitant only of rotten Morasses; this however is of small Consequence, be the Plant what it will, or grow where it will, its Effects are sufficiently ascertained, and these are all a *Royal Society* need take any Care about. He says, it is so miraculous a Vulnerary, that but to touch it, is to be healed; and for Conviction, assures us, that the Deer, when wounded, only run to this Plant, and lie down upon it, in order to cure themselves. Sir *George*, not above learning from the Brute Creation, made a Salve with the Herb with Butter and Wax, which he tells us had no Fault, but that it healed

a Wound too quickly. Ought not one to suspect from this, that Sir George was a Surgeon?

We are vastly apt to suspect two Things, in regard to this miraculous Matter ; the one is, that Sir George, or somebody for him, stole this Account of its Virtues on the Deer, from the old Story of the Goats of *Mount Ida*, curing themselves of their Wounds by the Dittany that grows there ; the other, that if ever the Ointment mentioned was made, the Wax and Butter had more Effect in the Cure than the Asphodell.

C H A P. VI.

Of a Child terribly wounded in its Mother Womb.

INNUMERABLE have been the Stories of Legs and Arms broken, nay and lost in their Mother's Womb, without any Body's being able to find what was become of them ; of fractured Sculls and torn Flesh of Infants, and a thousand other Maimings of the same Kind, from the Mother's Imaginations, and from terrible Sights exposed to her : the incredulous World have laughed at such sort of Stories, but when we have produced one from so incontestable an Authority as the Philosophical Transactions, People we hope will know better what sort of Judgment to form of them. This amazing History stands in the two hundred and twenty-first Number of that most eminent Collection, and runs thus.

A female Child was born with a Wound in the Breast four Fingers long and an Inch broad. The Operator no sooner saw it than he asked the Mother if she had never been frighted with any thing about her Breast, for that the Child had a Mark of a Wound there : The Hint was no sooner given than the good Woman, eager to have a strange Story in her Family, declared she had, five Months before, heard a Report of a Man's killing his Wife by giving her a Wound in the Breast : Ay, there it is, replied the Doctor, you have lost your Child by it. The Infant bled to death ; and the Doctor communicated the Story as he chose to tell it to the *Royal Society* : in his Account he tells them, that the *Strength of Imagination* in the Mother had given the Wound, and assures the Society, that he had convinced the good Woman of the Wound's

Wound's being of long standing, from its Appearance, and from some *Contusions* that happened to be about it, tho' it had not killed the Child till it came into the Air.

It was in vain that some unlucky Body asked how the Knife came into the Woman's Womb to make the Marks that some People had plainly discovered, of two or three different Slashings in the Wound. The Society reasoned upon it, they gave it entirely for the Truth of the Relation, and very judiciously determined, that the Absence of the Object that had occasioned the Disaster was nothing, for that a Woman might as easily inflict a Wound on her Child by hearing of such a thing as by seeing it. Could the Doctor have evaded prating, all might have gone well, but he unluckily confessed afterwards that the Wound was given by one of his own Instruments, tho' he had perfectly convinced the old Woman at the Gossiping, and the other old Women of the *Royal Society*, that it had happened by impossible Means.

C H A P. VII.

An Account of a Stone cut out of a Woman's Womb.

THE World is obliged to the often to be celebrated Dr. *Beal* for this very curious and accurate Communication. It stands in the nineteenth Number of the *Transactions*: The Author assures us, that himself saw the Stone, and examined it very carefully. Its Weight, he says, was near four Ounces; its Size, as appears from his Description, about that of a Goose's Egg, its Colour white, and its Shape oval, its Surface smooth, its Ends, one blunt and the other more pointed.

He tells us, that the Stone was taken out of the Womb by Incision, and the Woman perfectly well cured afterwards, tho' she had carried it with extream Pain eight or nine Years.

Many shrewd Suspicions occur on the perusing this Account. In the first Place, the Womb being a pretty odd Place for a Stone to be produced in, is it not extremely probable that a Member of the *Royal Society*, even tho' he had performed the Operation himself, might have made a small Mistake between the Womb and the urinary Bladder! or secondly, is it not possible, from its Size and its Weight, considered

together, that it might not be a Stone at all ; four times four Ounces would have been but a very moderate Weight for a real Stone of that Size. It will be asked then amongst these Suspicions, what are we to suppose this Body to have been ? If its Structure will not inform us sufficiently of this, from the very curious and inquisitive Doctor's never having enquired into it, let us consider whether its Place will help us.

We have an Account in the two hundred and eighty-fifth Number of these very Transactions, of a Woman's laying Eggs. *Olaus Wormius* is called in to testify this, and assures the World, that the Egg preserved at this Time in the Musæum of the King of *Denmark*, was laid by a Woman, and was immediately after the Delivery brought to him by a Person of unquestionable Credit, and the Fact confirmed to him by many more. We are told, that the Woman was delivered of two Eggs with all the Pains of Child-birth ; the Neighbours, who were present at this remarkable Delivery, broke one of the Eggs and found a Yolk and White in it as in a Hen's Egg, and they saved the other, which fell into his Hands, and from him got into the famous Musæum, where it is now preserved along with a petrified Child, which we are told was cut out of its Mother's Belly after it had lain there twenty-eight Years ; and is now in the lower Parts as hard as any Stone, and in the upper Part like Gypsum, and which we are assured in this very Paper of the Transactions is evidently a real human Fœtus, and not any thing artificial.

Now putting all these Things together, may we not reasonably determine, that a stony Egg, or, if we must use the societarian Term, a petrified Egg, might as easily be produced in a Woman's Womb as a petrified Child ; or, if we have a mind rather to take the other Side of the Question, may we not be allowed to suppose that as this Stone of *Dr. Beal's* was, according to his own Description, of the very Shape, Size, Colour, Weight, &c. of *Wormius's* Woman's Egg ; that it was really an Egg too, only as there happened not to be a Duplicate of it as there was in the other Case, the Doctor's Prudence would not suffer him to convince himself by breaking it, and so finding the White and Yolk, that it really was so. What Pity that Women will be so absurd to produce but one Specimen of a Kind in Things of this Importance.

If any Body should pretend here to object to the Improbability of Eggs and Stones, and petrified Children being produced in human Uteri, we may answer him in the Language of the very sagacious Mr. *Baker*, that there are every Day so many Things found to be true, which were once supposed not so, that it becomes a wise Man not to think any thing impossible. As to the present Case indeed, why may not a Woman in *Somersetshire* produce and bring forth Stones, or a Woman in *Denmark* Eggs, as well as a Woman at *Godalmin* Rabbits? Here is Fact for Fact, Evidence enough in our Favour, and doubtless one of them is to the full as true as the other. If we would reason on the Subject, let us quote the latest Work of that great Naturalist *Monf. de Reaumur*. We are there told of an amorous Intimacy between a male Rabbit and a Hen, from which that ingenious Author was in great Hopes of seeing either feathered Rabbits, or hairy Chickens; and why may we not suspect a like; Familiarity between a Male of that Species, and a Female of our own, the Result of which, according to the *Reaumurian* Method of Reasoning, ought to be no other than a feathered Embryo Man; or if an Abortion, as appears to have been the Case in regard to one of these Women, or a Petrification, as in the other, which happened at a Time while the Embryo was in its unhatched State, what should happen but what we exactly are informed did happen in these Cases, the bringing forth a fair Egg in the one, and the retaining a petrified one in the other; the least we can allow to the Male's Share in the Fœtus being, that it should be included, for some Time at least, in an Egg, tho' if the Ladies had gone on their Time regularly, it is at least as likely they might have brought forth Children, as that *Reaumur's* Hen should have answered his Expectations.

We are not to pass over, without its due Share of Praise, the Beginning of this very curious Paper, it is on the Subject of Petrification as well as the rest. The Author tells us, that a compleat Knowledge of the Nature of Petrification would be very agreeable, and a regular Description of the Process by which it is performed, from first to last, would be of the utmost Moment. For he argues, that if it lay in the Power of Man to cause Petrification at his Pleasure, and to direct and order the Process of it; the same Art might be useful to prevent the Generation of the Stone in the human Body, or to dissolve the same when already formed. Might not an unlucky Observer tell him, that we
should

should be better instructed to form or generate Stones in the human Body by this Means than to destroy them.

We will venture to promise, however, that when the *Royal Society* will instruct any Body to make these artificial Petrifications, we will find the Way to make them do one of these Things in the human Body as well as the other.

Should be better instructed to form or generate Stones in the human Body by this Means than to destroy them.
We will venture to promise, however, that when the Royal Society will think of any Body to make these artificial Experiments, we will find the Way to make them do one of these Things in the human Body as well as the other.

PART II.

MIRACLES

PART IV.
OF
MIRACLES.

IT seems to be a settled Opinion of the illustrious Body whose Works we are commenting on, that nothing can do a Philosophical Society greater Honour than a Belief in Impossibilities. This appears to be the Number of the many Doctrines received in the Infancy of the Society, and retained with due Reverence to its present Period. - Multitudes of the Papers animadverted upon in the preceding and subsequent Sheets of this Work, have as indisputable a Right to a Place in this Part as in those where they stand. The additional Consideration of Method has placed them where they now are, to the no small thinning of the Ranks of this Division.

PART IV.
Of MIRACLES recorded in the PHILOSOPHICAL TRANSACTIONS.

CHAP. I.
Of Demons in Lead-Mines.

THE Miners in many Parts of the World have had their Fancies as to Fairies and subterranean Spirits, inhabiting the Caverns and Fissures of Rocks, in which Nature has buried the Ore : They have told the good Women of the neighbouring Villages, a thousand fantastical Stories of seeing them in Grotesque Figures ; some big, some little, some light and airy, and some motionless and heavy as the Ore they lived among.

The World has been used to look upon all these Stories as whimsical and ridiculous ; but surely it has not been observed, that there is sufficient Ground to believe the Existence of such *Dæmons*, from the Accounts given of Things of this Kind, in the Philosophical Transactions. One would imagine, that Matters, which the *Royal Society of London* look upon as Facts, might have a Claim to some Estimation, in the Eyes of the rest of the World. We have many occasional Hints of these subterranean Spirits, dispersed in the minerological Parts of their Works ; but what of all other Things is the strangest, and most incontestible Proof of the general and settled Belief of the Society in the Existence of such *Dæmons*, is, that in the thirty-ninth Number of the Transactions, where the Lead-Mines of *Mendip-Hills* in *Somersetshire* are described, it is mentioned as a very singular Circumstance, that the Miners had never seen any of them : The Author indeed observes, that they had heard them frequently, and that they had very good-naturedly knocked and hammered in the Ground, beyond where the People were working,

ing, and by that Means pointed out where the greatest Treasures of the Ore lay; for that the Miners had generally been sensible enough of what those Knockings they heard were, and had made it a Custom to dig towards them, in which they never failed of their Reward, in the Quantity and Richness of the Vein they discovered. The Author, indeed, towards the Conclusion of the Paper, seems to acknowledge too, that he had been too rash in his Affirmation of their never having seen any of them; for he observes, that a Person whose Name was *King*, did really find in his Groove one Day, a heavy Thing of about four Inches long, in which they found out the Eyes, Arms, Legs, and Breast of a human Figure. Whoever will compare this Description with that of the least kind of subterranean *Dæmons*, will find great Reason to be convinced, that as sure as ever any such Creature existed, this was one of them. The Event also perfectly answers the general Intent of their discovering themselves, which is allowed to be with the civil Design of pointing out the richest Parts of a Mine; for the Author expressly tells us, that the Mine in which it was found proved very rich.

After such an absolute Proof of the Existence of these subterranean *Dæmons*, we hope the World will pay more Respect, than has been of late done to the good People who relate the Exploits of them: For our own Parts we are as fully convinced of their Existence, as we are, or ever shall be, of any thing that we have no other Proof of, than the Assertion and Testimony of the *Royal Society*. We should not omit, that it is in this very Paper also, that we have the remarkable Account of the Vein of the Lead Ore, now and then giving the Miners the Slip, and running up into a Tree: They complain heavily, we are told, of not being able to discover this of a long Time, because the Tree suffers no Change by the Accident, but flourishes just as well as it used to do before it happened.

C H A P. II.

An Account of a Ball of Sulphur generated in the Air.

MIRACULOUS Occurrences are very frequent in the Memoirs of the *Royal Society* of *London*; they sat out with a Love of them, and they continue in it. The History of Geese growing in Shell Fish,
was

was one of their very early Discoveries, and this of a Mass of solid Sulphur, formed, or to use the very societarian Phrase, generated in the Air, is one of their latest. It is a sort of ill-natured Office to lead People out of Errors that please them; but it is a Thing that those, who wish so well to the *Royal Society* as we do, cannot dispense with, tho' sensible that it may be attended with some little present Uneasiness.

We are not yet convinced, by all that has been said in favour of solid Bodies falling from the Clouds, that any thing solid, excepting only such as may be formed out of an aqueous Fluid by the mere Effect of Cold, ever did, or ever can fall thence; not but that we have read, indeed, in the Transactions and elsewhere, of Showers of Wheat, of Pebble-Stones, of Frogs, and of Whittings, and very lately of one of Ivy Seeds, mistaken by a *Chelsea* Gardener for Garlick; but till we can be informed in what Manner these several Bodies can be formed out of Water by Freezing, we chuse to suspend our Belief of the Facts, however well attested.

We are to acknowledge that we can at present form no better an Idea of a Ball of solid Sulphur being formed in the Air, than of Whittings, Pebble-Stones, or Ivy-Seeds being generated there: But let us enquire into the Societarian Reasons for believing it. The Account stands so late as in the four hundred and fifty-first Number of the Philosophical Transactions: Its Author is Mr. Cook, a very ingenious Apothecary of the *Isle of Wight*. We are to put this Gentleman in mind of one thing, however, by the bye, which is, that he is but half qualified for a Writer of Transactions; every Man else on these Occasions sees the most essential Circumstances of the Facts he describes: People, who tell us of Showers of Wheat and Whittings, would not be believed, they think, if they did not assure us that they saw them fall: But this Author's strict Adherence to Truth, spoils half the Merit of his Story: He does not tell us it was his good Fortune to see this Ball of Sulphur, which he supposes to have been generated in the Air, fall out of it; he only tells us that he found it lying on the Ground, and has great Reasons for supposing it could get there no other Way.

The Circumstances from which he collects its Origin, are these: It had lightened and thundered much in the Night and rained towards Morning: Some Hours after this, a Countryman walking over the Meadows, near the Sea Shore, met with this *Ball of Sulphur* lying upon the Surface of the Earth. Mr. Cook tells us, that it was roundish in Figure and of a yellowish Colour, much harder than common Sulphur,

and of a very *different Texture*, and was covered over with fine bright glossy Crystals, of a *yellowish Colour*, that it had some Depressions and Cavities on its Surface, and some little Holes going into its Mass, and that it was firmer and harder in some Parts than others. Such is the Account the Author gives of the Ball itself. His Reasons for supposing it to consist of Sulphur, do not appear; but those for his judging that it fell from the Air, are these. 1. That if it had been formed under Ground, it could not have got to the Surface without losing its Crystals, which fell off with the lightest Touch; or at the utmost, not without sullying them. And, 2dly, That its Holes and Cavities, if it had been formed in the Earth, and brought up thence to its Surface, must have been filled with Dirt.

These Arguments have appeared conclusive to the *Royal Society*, and the Members seem as perfectly convinced as the Author, that it was *intended* for one of those Balls of Fire that sometimes burst in the Air, or on the Ground, and do vast Mischief, but that it missed Fire. We repeat the Author's Words in this Sentence that we may not misrepresent him: For our own Parts, we want a great deal more to convince us, that it was as represented in these Suppositions, and are firmly of Opinion, at present, that it was neither Sulphur nor generated in the Air. Why are we to suppose a Thing to be Sulphur, which the Author himself tells us was much harder than Sulphur, was of a different Texture from Sulphur, and was covered with Crystalline Efflorescences on its Surface. These rather tend to convince us that it was not Sulphur, and yet we have not one more Reason given us for believing that it was so, except that it was yellow: This is a Colour that we are apt to believe may belong to other Substances besides Brimstone; and as to the fiery Trial mentioned by the Author, it serves, like all the rest, and indeed like most Societarian Arguments, to prove just the contrary to what the Author intended; he tells us it burnt with a *white Flame*; whereas we are apt to fancy that Brimstone burns with a blue one.

These are Mr. Cook's Reasons for believing the Substance, under consideration, to have been Sulphur. It remains to animadvert on his Reasons for the second Part of his System; namely, its falling from the Clouds.

The Assertors of the Raining of Fish, Frogs, and Pebbles, all found their Belief of the Fact, upon their finding those Things on the Surface of the Earth, and not knowing how they came there, the same Reason

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is also alledged by Mr. Cook, for his believing this Ball of Sulphur to have fallen from out of the Air, but with this essential additional one, that the Form, under which it was found, rendered it absurd to suppose that it had been raised out of the Earth in it.

Notwithstanding the Weight of all these Arguments, we shall venture to assert, that this Ball was probably not Sulphur nor generated in the Air. The shooting out crystalline Efflorescences on the Surface, is not a Property of Sulphur, nor is the being in Part mouldring and friable, and in Part solid and firm, a Property of the Masses of it. Let us enquire, however, if there is nothing else, to which these and the other Properties attributed to this Ball of Matter belong: We are told of a roundish yellow Body, of a sulphurous Quality, burning with a white Flame, and covered with these downy Efflorescences on its Surface: Is not this a very good Description of common globular yellow Pyrites? And might not such a Body be made to answer every Particular, and to explain every Objection of this Author's. As to its being found on the Surface of the Earth, Pyrites of several Sorts frequently are so, and particularly those of this globular Kind. The Size, Figure, and Description of this Ball, as Mr. Cook gives them, perfectly agree with such a Pyrites, and the crystalline Efflorescences he describes on its Surface, tho' very difficult to account for, supposing it Sulphur, are very easily reconciled to it as a Pyrites. We are told that it had rained in the Morning; and the State he describes this Body in, is just such a one as a hard Shower might easily bring on in a Pyrites that had already lain long enough in the Air to be ready to shoot. After a thorough Wetting, Bodies of this Kind will often crack and discover Holes in their several Parts, and will be covered over with just such Crystallizations, as Mr. Cook describes, fine, pellucid, and falling off with a Touch; these are in general colourless, and are Efflorescences of pure Vitriol; sometimes they are yellowish and less bright, having much the Resemblance of powdered Sulphur, and as easily falling off. All Mr. Cook's Objections are answered, by supposing this to have been the Case; and the seeming Impossibility of the Ball's having been formed in the Earth, from its Holes not being filled up with Earth, and its Crystallizations or Efflorescences not rubbed off, is easily got over, when we declare those Holes and those Efflorescences not to have been about it while in the Earth, but to have been formed by the Effects of Air and Rain, after it had been by some Accident thrown upon the Surface: On this

Supposition also, its burning with a white Flame is easily explained, since many of the Pyrites, which have something arsenical in them, burn with a whitish or greenish white Flame instead of a blue one. Upon the whole, what the particular Ball, Mr. Cook describes, might be, we cannot pretend to be quite positive, not having seen it; but the World will have shrewd Suspicions about it, when we inform them, that Pyritæ of a globular Form, and answering to all the Characters Mr. Cook gives of his Ball, are found in the very Places where his was picked up, and that two or three have been sent over to us from thence, one of which only remains at this Time, the others having, after being covered with the Efflorescences, described by Mr. Cook, and grown rotten, and cavernous, fallen into Powder.

PART

PART V.
OF
ZOOPHYTES.

THE Term Zoophyte, being one of those not founded on any thing in Nature, has done great Honour to many of the Describers of the Works of Nature who have adapted it. We flatter ourselves, that it was never more justly attributed to any thing, not even to the Animal Flower, than to the Vegetation of Muscles and Oysters, or to the Seed of a Plant, which has been proved to the Royal Society, as much as Things are usually proved to it, to be of an animal Nature, and possessed of that great Characteristick Quality Locomotion.

PART V.

OF ZOOPHYTES, treated of at large in the Publications of the *Royal Society*.

CHAP. I.

An Account of a strange Creature called Bakera; described in the Philosophical Transactions under the Name of An odd Aquatick Animal.

IT has been a Custom with the Botanical Writers of this complaisant Age, to give to any new Plant they discover, the Name of some Friend or Correspondent; or of somebody whom they are desirous the World should be informed that they had the Honour to be known to. We have not a great deal to say as to the Idea such Names as these convey of the Plant they are given to; but as they serve to commemorate the Friendship and Esteem that once existed between the several Professors of the same Science, and give them an easy Opportunity of immortalizing one another's Names, we think they are of very publick Emolument and Utility.

Not to be wanting on our Part in promoting so amicable a Scheme, we have chosen to testify to the World our Friendship and Esteem for the very eminent Societarian Mr. *Henry Baker*, by immortalizing, so far as in us lies, his Name in the same Manner, by giving it to a Creature, which it is his great Honour to have had a very considerable Share in the Discovery of.

If the censorious Reader, when he has gone thro' our Animadversions on this Animal, as it is called, should think we have dealt hardly with a Gentleman of Mr. *Baker's* Eminence in the Philosophic World, in commemorating his Name by Means of an Animal which is no Animal at all,
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we have only to reply, that himself and the Society are to answer to that; that they describe and receive it as an Animal, and that notwithstanding all ourselves have proved to the contrary, we are very certain that it is as much an Animal as he is a Philosopher.

We are sensible of the Justice of the general Complaint against Names of this Kind, that they want appropriation; that if the Name *Milleria* had been given to the Plant *Collinsonia*, or that of *Collinsonia* to the *Milleria*, each of the Plants would have been as well expressed as they are at present, and so of the rest: We do acknowledge that *Randia*, *Boerhaavia*, *Claytonia* and *Linnaea* are of the Nature of *Bays's* Prologue and Epilogue, of which the Prologue might as well serve for an Epilogue and the Epilogue for a Prologue, and either of them would suit any other Play as well as that they were written for. But far from submitting our Name of *Bakera* to the same Censure, we shall venture to assert its peculiar Appropriation to the Subject, and to propose it as a Model to the future Christeners of God's Creatures in this Way; affirming, with all that Freedom which becomes People who are in the right, that there is so strict a Relation between the Man and the Thing, that there is no Creature in the visible World except this, that could convey any Idea of Mr. *Baker*, no Creature of the human Species, except Mr. *Baker*, whose Qualities approach to those of the Subject named from him. There are not many Men whose Names could convey a proper Idea of a mongrel Business, which as it stands recorded in the Transactions is neither Animal nor Vegetable, neither one thing nor another; but what in its true and real Nature is a teasing, troublesome, vexatious Thing, avoided by every Body that knows what it is, eager to fix its Claws into every Stranger that comes in its Way, when fixed, the difficultest of all Things in the World to get rid of, and good for nothing but to lead People into Errors. After giving the Name and Reason of the Name of this strange Thing, it is Time we proceed to its History.

The true State of the Discovery is this. Dr. *Henry Miles* of *Tooting*, found some Seeds of a common Plant, the *Bidens*, fallen into a Ditch. To distinguish Animals from Vegetables, or from Parts of Vegetables, is not the Talent of a true Societarian: The very ingenious Doctor found Means to get them out of the Water, and, eager to shew himself of the true philosophic Race, sat down to examine them with Attention, and as the Result of his Examination, drew up an Account of their Nature

and

and Qualities, and sent it with the Bodies themselves to the *Royal Society* by the Hands of Mr. *Baker*. His Account, as it stands in the *Transactions* is, that it is *an odd aquatick Animal*, found in standing Water: That he kept some of them in their *own Element* in his House, but that they *all died* in a Day and half's Time; that they seem to be nothing but *Skin*, and are no thicker while *alive*. That they have the Power, as most aquatick Insects have of *sinking themselves to the bottom of the Water* on the approach of a Stick, and that when taken out and laid upon a Paper they will *spring away like a Grasshopper*. The Doctor concludes with an Observation of their great Scarcity, and with a Suspicion that they are the Insect called *Tipula* not arrived at its perfect State.

Baker and the Doctor had been long professed Friends, but alas! what Friendship can stand against a Rivalship in Fame. Tho' he knew no more either of Seeds or of Animals than the Doctor, he had no sooner read the Account, than something whispered him within, that this was a Discovery in his own Way; perfectly like all his own Discoveries; and was destined to breed him up a Rival in a Society where he had hitherto sat without Compeer. What was to be done? To suppress the Paper was impracticable; the Doctor would have found some other Hand to have conveyed so great a Discovery by, had he attempted it: Since it was impossible to rob his Friend of the Honour of so glorious an Invention, the next thing was the sharing it with him: But how was this to be done? The Doctor's Description was full enough as to the Properties of the Creature; and as to the Form of it, that shewed itself, as the Specimens sent were to be laid before the Society. Happily the Doctor had only used his naked Eye in the Examination, a Microscopical Disquisition of so strange a Subject promised great Things, and seemed reserved by some good Angel to Mr. *Baker's* Share: He calls in the Assistance of his Glasses to his Aid, and by the help of these, distinguishes what the Doctor had but a very imperfect Idea of, the *Head* and *Tail* of the *Animal*. Proud of the Discovery, he draws up a Paper as long as his Friend's; in which he very carefully repeats what the other had said before, and adds to it a Microscopical Description of the Creature, not omitting any Circumstance his judicious Eye could discover to him, and particularly describing the three *Horns* on the Animal's Head, and the Prickles that both they and the Body were armed with. The outer Form of an Object is not enough to satisfy so inquisitive and curious a Genius

as Mr. *Baker's*, he leaves it to the Doctor to be content with the superficial Examination, and to shew his own superior Talents, he dissects the Body carefully, and on examining its Contents, he discovers that it is truly an Animal in its aurelian State, and seems to hold the Doctor very cheap, who had confined his Observations to what he now found to be only the Husk or Case of the enclosed Animal.

These are the Accounts given by these two most eminent Naturalists, as they stand printed so lately as in the four hundred and sixty-ninth Number of the Philosophical Transactions; but the Authors, as if still not judging them perfect, have added each his Postscript to them; that of Dr. *Miles* gives us the History of an Event which befel him in the Management of the Creatures; he tells Mr. *Baker*, that the *Animals* he sends him were *caught* the Day before, and kept in Water in a Glass till the Time of his finishing the Letter, but that on his going, on the concluding of that, to pack some of them up to send with it, he thought they were all gone, but that on a nearer view, he found they had got down to the Bottom of the Water, and were there hanging together by the *Tails*. Not to take any Notice of the farther Proofs of Animal Life, which the Doctor gives these poor Seeds in this additional Paragraph, we cannot but observe a little Difference between the two Authors that appears pretty clearly in it: These *Tails* by which the Animals hung together, according to the Doctor's Account, could be no other than the bearded Prickles of the Seed, which Mr. *Baker* calls the Horns; and as Horns grow on the Heads of Animals, and Tails at the other End of the Body, nothing is more evident than that these Gentlemen between them could not make out which was the Head and which was the Tail of their odd aquatick Insect. So much for the Doctor's Postscript. Mr. *Baker's* consists only of a Query, *What Animal is this in its perfect State*. A Query that will long do Honour to the Philosophic Genius who proposed it; to the *Royal Society* of *London* who were not able to answer it; and to the Transactions in which it is printed.

Upon the whole, we have a very good Instance in these Papers of the State of Natural Knowledge in the Royal Society in the Year 1743; and, which is a Thing of about as much Importance to the World, of the Manner in which Mr. *Baker* treats his Friends. The poor Doctor could not be permitted to enjoy his Blunder in Peace, but this insinuating Creature must steal into a Share, must point out to the Society his De-

Defects, by adding a Figure of the Creature himself, and after telling the World, as he plainly enough does, that the Doctor did not know the Head of an Animal from the Tail, he finally sets aside his Opinion of the Creatures being the *Tipula*, by an absolute Query of what it is.

It is but Justice, that this should stand as an everlasting Memorial of Mr. *Baker's* perfect Skill in the Microscope, of his great Knowledge of the Way to use it to Advantage, and of the important Discoveries he has made, and will hereafter make by it.

This Gentleman's Reputation in the learned World, tho' not very inconsiderable at present, is evidently of that Kind that must continue to encrease, so long as he continues to write : We know of no other Man indeed in the present Age, whose Character is so picturesquely described in these two excellent Lines of our late Friend Mr. *Pope* :

No Crab more active in the dirty Dance,
Downward to climb, or backwards to advance.

That the Blunder might not stand as a Scandal to the Age as well to the *Royal Society* ; and that its Author might not go unrewarded with his due Share of Fame, I, after an abundantly sufficient Time for his discovering it himself, if he had been able, gave Information of it to the President, and with that Information some of the Seeds of the Plant, picked out of a Head of it in my own Collection. I have informed him of several other Blunders of a like Kind since, one half of them I believe by this very Mr. *Baker* and his Correspondents ; could I have obtained the same Redress of them as in this Case, these Animadversions had never been printed. The President could not but be struck at the Notice of so flagrant an Error ; invidious as he was at the Author of his Information, he insisted on a Recantation in Form from the Authors of the Paper ; Dr. *Miles* was convinced and consented ; Mr. *Baker's* Name does not appear to it, so that probably he is of Opinion that they are Animals still. The Doctor, to do him Justice, received the Information of his Error as he ought, he even solicited an Acquaintance with me afterwards : But must I also do Justice to the Society : The Recantation was drawn in Form, and had passed the Examination of the Society, when the Secretary brought it to me to know if it was right : How was I convinced of the Justice of the Character that Body had long held with me, when I saw in this Paper that the Doctor now had informed himself

that what he once took for Animals were the Seeds of the *Jacobæa*; Seeds about as like those of the *Bidens*, as Mustard is to Aniseed; I desired it might be altered to, that the Doctor had been informed that they were the Seeds of the *Bidens*; this however was too much to be entirely complied with, the Doctor will keep the Honour of being his own *Informer*, but he has graciously condescended to alter the Name of the Plant according to the Directions; and partly to save his own Reputation in some Degree at least, partly to be even with his taunting Friend *Baker*, he has added, that he verily believes these Seeds were at that Time *possessed by some Animals*, tho' all his Microscopes were not able to discover any of them.

The Secretary, heartily mortified at having published such a Paper, took some Pains to assure himself of the Reality of the Bodies being the Seeds of a Plant, but alas, so short lived are Discoveries not rooted by Science, that in less than half a Year after, when somebody in Banter brought him a Handful of the Plant, and asked him what it was, he did not find himself qualified to give an Answer.

CHAP. II.

Of the Vegetable Nature of Oysters and Muscles.

IN the preceding Chapter we have endeavoured to do proper Honour to two very eminent Authors, employed in the raising a vegetable Seed into the Rank of Animals; in this we are to do the same Sort of Justice to another Author, who seems growing apace toward the same Pitch of Knowledge and of Reputation, and who takes as much Pains and uses Observations and Arguments full as accurate and philosophical, to reduce two Creatures that Nature certainly meant for Animals, and that all the World beside have hitherto allowed to be such, to the Nature of Vegetables.

This curious Paper is written by a Person whom the Society calls Dr. *John Bartram*, and stands in the four hundred and seventy-fourth Number of the *Transactions*. This very Philosophick Writer informs his Friend Mr. *Peter Collinson*, that he had observed something of an extraordinary Nature in the Muscle, namely, that it has *Roots of the fibrous*

fibrous Kind which strike deep into the Earth, and that it therefore seems to be of a vegetable Nature. As he thinks it highly probable that the Animal draws part of its Nourishments thro' them. He argues, that they doubly do the Office of Roots; serving at once to convey Nourishment to the Fish, and to fix and secure it against the Motion of the Water. The last of these Uses the World will certainly allow him; and his Proof of the first, which would otherwise have seemed somewhat doubtful, is very rightly calculated to have the Effect it was intended for, that is, to convince the *Royal Society* of the Truth of the Proposition; he argues, that they must be destined to convey Nourishment to the Creature, because *they are dispersed at their opposite Ends through the whole Body of the Muscle*. Other People perhaps would have thought, that if intended for the conveying of Nourishment to the Animal, they would not have terminated in different Parts of its Body, but all have gone to the Stomach: But the Society has adjudged it otherwise; they have received and countenanced his Paper, and doubtless will put *F. R. S.* as well as *M. D.* to the Name of its Author.

As to Oysters, he thinks the only Plant in the World they are like, is the *Opuntia* or *Indian Fig* as it is called; there is, he says, indeed a great Similitude between these. The *Opuntia* sending forth one Leaf, which afterwards becomes the Support to another Leaf, and so on; and in the same Manner one Oyster growing by the Side of another till the Cluster extends to a great Length and Breadth. He adds, that the old Oyster thus supports a young one till it be pressed down into the Mud and buried forever in it, and that this young one afterwards produces another, which by degrees presses it down in the same Manner. The Oysters, according to this Account, are a very cruel Sort of Parricides; but we cannot find out the Similarity between this and any thing that relates to the *Opuntia*, no more than we can discover any thing in that Plant corresponding to the other great Quality he mentions in the Oyster, when he assures us, that it has a Power of opening and shutting its Shell like a Muscle. This we doubt not however, but the ingenious Author will explain in a future Communication, and if we could prevail with Mr. *Baker* to lend him a Microscope, and inform him of the Manner of his using it, when he examined the Seed of the *Bidens*, we doubt not but he will be able to discover the Circulation of the Blood in the *Indian Fig*, and the tubular Cavities in the Filaments of the Muscle, and

and thus convince the Society of the perfect Analogy between these several Parts of the Creation.

In the mean Time, however, let us enquire a little into the Truth of what he has already discovered: He has very plainly discovered, that he does not know what *the Beard of a Muscle is*; and has pretty fully convinced the World, that the *Royal Society* does not know any more of it than he. All the Muscle Kind, from the *Pinna Marina*, down to the smallest Species, protrude this filamentous Substance, which he takes to serve the Office of Roots, but which is truly of no other Use to any of them, but for the fixing themselves by, and moving at Pleasure. It must needs be *very extraordinary*, therefore, as the learned Author expresses it, that the Muscles of *Pensylvania* should do what all the other Species of Muscles of all the other Parts of the World always did; nobody, however, will question its being properly a *new Discovery*, both on the Part of the Author and of the *Royal Society*; since, tho' it must be acknowledged, that all the Authors who ever wrote of Shell-Fish mention it; yet it must be acknowledged too, that neither Dr. *Bartram* nor the *Royal Society*, seem to read any of them. How much Nourishment these Fibres convey to the Animal, the rest of the World will indeed be very able to judge, when they find that they neither are hollow, nor have any Communication with the Stomach; but we doubt not but that Society will, notwithstanding any such trivial Observations, remain convinced, that they prove a vegetable Nature in it.

As to the very curious Analogy between the Oyster and the *Opuntia*, and his Deductions from it, we are of Opinion, that when he has added to it the Improvements we have mentioned, it will be one of the greatest Discoveries made in our Time; but that in the mean while, the *great Similarity* he has made out between these two Things, is much of the Nature of that between the Man and the Horse, urged from the former's being born in a Stable. There is no more Connection by Vessels, no more Circulation of Juices between the old Oyster-Shell and the young one, than there is between the Leaves of the *Opuntia*, and the earthen Pot that holds the Earth it grows in; nor does the young Oyster affix itself to the Shell of the old one, preferably to a Stick or a Stone; it would adhere to either of them as firmly as to the other, if they were placed in its Way, and has no more to do with the Shell of the old one, than as the nearest solid Body to it.

The curious and ingenious Author concludes his Paper with another Observation, equally wonderful and rare with the others; namely, that the Fresh-Water Muscle is *very different* from the other, and has a Power of creeping along the Mud like a Snail. It is not very wonderful, sure, that the Fresh-Water Muscle should be different from the other, when it is a Species of a quite different Genus of Shells, and is no more a Muscle, tho' vulgarly called one, than the crustaceous Fish called *Long Oyster* by our Fishermen, is an Oyster. What could the Author think of the *Royal Society* of *London*, when he gave them an Account of the Creeping of this Animal, as a Thing unknown to them? And yet, alas, what did he think of them but the Truth! Dr. *Mortimer* adds a Note, to inform them, that he had seen the very same Thing in *England*. It is a Pity but that he had also seen the Beard of a Muscle, and could have informed the Society, that that Animal had such an Appendage.

It may be unluckily asked on some such Occasion as this, who are the Authors of the Philosophical Transactions? Who are all these nameless People, whose Papers we are entertained with there? It is easily answered, that all that they receive, countenance, and publish, by whoever it be written, is from that Time theirs: But if Curiosity should go still farther, and insist on being satisfied, let the Correspondents in general be judged of by this very eminent one Dr. *Bartram*.

Doctor is a good travelling Name, as the Thief says in the Play, and the Society are never backward in giving their Friends Titles: They would have all their Members, and all the Correspondents of their Members, appear Men of Consequence: The Title of Doctor bespeaks some sort of Respect and Credit, and is a very safe one, when nobody will ever enquire into it, when the Person it is attributed to lives in another Kingdom, was never heard of before, nor is ever likely to be heard of again. Words may easily be used in Senses very justifiable, tho' not intended to express exactly, what the People who use them, know the World will understand them to do. When *Richard Roe*, a Physician, whose Works have been attributed to the Author of these Animadversions, published his mock Vindication of the *Royal Society*, he called himself a *Fellow*. People at first chose to understand by it, that he was a Fellow of the *Royal Society*, tho' doubtless he meant no more by it, than that he was a *very odd Fellow*. When *Richard Rock*, of immortal Memory, added to his Name the significant Capitals, *M. L.* the World supposed he

he meant it to express *Medicinæ Licentiatus*, a Licentiate of Physick; while the ingenious Author of it, who had in Times before been a *Maker* of wooden *Legs* to one of our Hospitals, probably intended no more by it, than to denote that to have been his former Profession: In the same Manner, when the *Royal Society* give the Term Doctor to *John Bartram*, perhaps they intend to be very well satisfied with the World's supposing, that they mean to express his having taken the Degree of a Doctor in Physick: We know very well, however, that the Word Doctor in its primitive Sense, signifies no more than Teacher, and as such is properly applicable by the *Royal Society*, to any body who is able to teach them, as the Person now under Consideration seems perfectly qualified to do. In this Sense, therefore, according to the Authorities of *Richard Rock* and *Richard Roe*, we do imagine that the *Royal Society* call *John Bartram* Doctor; we flatter ourselves, that they cannot mean to express by it, that he has taken a Doctor's Degree, because that is not a Truth.

John Bartram is an Inhabitant of *Pensylvania*, a Planter of the meaner Sort; so mean, indeed, that he owes the little Knowledge we have of him, to his having been some Years employed, at a very small Price, to travel over his own and some of the neighbouring Colonies, to collect the Seeds of the *American* Trees, for the Curious here. His Industry in this Occupation, deserves the utmost Praise; and his Improvement in the Knowledge of the Plants he met with, was surprising; from being scarce able to write, he in a few Years got such a Knowledge of the Vegetables there, that he became able to apply the Names he found in our Letters, pretty regularly to them, and to express his own Opinion of them tolerably intelligible. We mention this as a very high Encomium on a poor illiterate Planter, and we esteem him extremely for it; but to set aside the Term Doctor, added to his Name, we cannot think that such a Man as this can be qualified to write Philosophy for the Instruction of any *Royal Society* in the World, except one; and we could have wished that one not to have told all the World they were an Exception, by publishing such Disquisitions as are the Subjects of this Paper in their Transactions.

CHAP. II.

An Account of an Animal Flower.

THE World is obliged to the very reverend Dr. *Hughes*, a Gentleman, who has since published a whole History in the same Stile, for the Description, and as himself tells us, for the Discovery of this most amazing of all amazing Things. The four hundred and seventy-first Number of the Philosophical Transactions has the Honour of giving it a Place among the Works of the learned and ingenious, as the Publisher of those Papers calls their Authors.

The very ingenious Author has not the quickest Eye in the World at discerning Contradictions; he unluckily sets out with one in the Title of his Account; he expressly calls the Thing that is the Subject of it, a *Flower*, the Word Animal he there uses in an adjective Sense, and gives merely as an Epithet, expressing its having some Resemblance to the Animal Creation; but in the very setting out, towards the Description, he declares, that it is a Flower, which he verily believes to be an Animal, and in three Lines more he is perfectly convinced that it is one.

Whether we are to abide by the Name or by the Description, may with some, be Matter of Doubt; for our own Part, we are fully of Opinion, that the latter, not the former, conveys the Meaning of the Author. We could have wished for this Reason, however, that the Name had been changed from the Animal Flower to the Flower Animal, in the after Publication; but Mr. *Hughes* is too much a Societarian to condescend to mend a Fault.

It is impossible to read this Paper, without doing the Author of it the Justice to own, that he is a very close Copyer of the Manner of that Prince of Societarians, *Henry Baker*, Esq; a great Part of the Paper is spent, as is usual, in those of that Gentleman, in Matters foreign to the Purpose. The material Articles in the Description of the Creature, are in general omitted, and Matters of no Consequence described with amazing Nicety and Precision.

The Creature was found in a Bason of Water in a Cave; inhabiting the Cavities of a Stone that lay in it: It might as well have been

found on a Rock on the Coast, if the Author had looked for it there, but that he has omitted to give us any information of: He very punctually tells us the Diameter of the Cave, the Depth and Dimensions of the Bason of Water in it, and the Length, Breadth, and Thickness of the Stone in the Middle of it. On this Stone, he tells us, he found this surprizing Creature, which he seems now wavering again, between the Plant and the Animal Nature, as to which of them he should determine it to be of: He calls it, indeed, still an Animal; but in the Description, he uses all the Terms proper to express the Parts of the Flowers of Plants: He tells us of *Pistils* and *Stamina*, of Leaves and Stalks, and seems to wonder that he could find no *Apices*. Some of these Parts, however, he also gives the synonymous Names of Arms and Claws to; and in fine, concludes with a professed Uncertainty, as to which of the Classes of Creatures it is to be referred to, declaring, that if it be an Animal, he believes its *Stamina* serve it in catching its Prey; and that what he elsewhere had called the Socket of the Flower, is the Creature's Mouth.

What is the World upon the whole to judge of a Thing, which the Man who describes it, seems in so much Uncertainty about; and which the *Royal Society* do not seem in a Condition to set him clear in: Which in the Title to the Account is an absolute Vegetable, soon after is suspected to be an Animal: After this is mentioned with Certainty, as an Animal; then is described with all the Parts of the Fructification of Plants; and in fine, is left in more Uncertainty than it was at first, by the unlucky Monosyllable *if*.

We are to add, that the Author in his later Account proves, that he knows full as much of the Matter as he did when he wrote this: Whatever he may be suspected to want, however, it is pretty evident from both Accounts, that he does not want a sufficient Pride in his own great Merit, or in the Consequence of his Observations. He delivers this as the History of a Creature wholly unknown to the World before, not described, so far as he knows, by any Author of ancient or modern Times. This is the Consequence of writing before People have read: The Assertion may be true indeed, in the Form in which it stands; for it does not appear that the Author has read any Authors at all on these Subjects, either Ancient or Modern: But there is not one of these, if he had read them, but he would have found an Account of it in.

Dr. *Mortimer* observes, in a Note, that *Gesner* and *Johnson* had described it before ; and he might have added to the List *Aldrovand* and *Rondelet*, and in short, almost all the Authors who ever published upon these Subjects. They have all of them described, most of them figured it, and have all very properly made it a Species of that Genus, distinguished by the Name of *Urtica Marina*. Some of them have given us, indeed, such Descriptions of it, as shewed they had not a much better Idea of what it was than Mr. *Hughes* ; but there are enough, who convince us that they were somewhat better acquainted with it*.

* Those who would be further acquainted with the Performances of so great an Author as Mr. *Hughes*, we refer to his natural History of *Barbadoes*, lately published in a pompous Folio: But such as may not chuse to gratify their Curiosity at the Expence of a *Guinea*, may meet with Satisfaction at a much cheaper Rate, in the *Monthly Review*, for *July* 1750 ; where a very entertaining View is exhibited of this wonderful Book.

Dr. Mavor observes in a Note, that Geyser and Volcanus had been
 described in detail; and he might have added to the list, the
 Andes, and in short, almost all the Andes who ever produced
 their vapors. They have all of them described, and of them
 it and have all very properly made it a subject of their
 inquiries by the Name of Volcanus. Some of them have given
 us indeed, such Descriptions of it, as show they had not a much
 far from what it was then. Mr. Mavor, however, is enough, who
 considers that they were formerly better acquainted with it.

That who would be further acquainted with the Performance of so great an Author
 as Mr. Mavor, we refer to the History of the Andes, lately published in a
 Note. But last at this, and ends to greatly their Curiosity at the Expense of a
 very interesting Dissertation on a much larger Matter, in the History of the
 1771 where a very interesting / new chapter of the wonderful

PART II.

ANALYSIS

CHAP. I.

2

PART VI. BOOK I.
OF SUBJECTS relating to the Human
Species.

PART VI.
ZOOLOGY is one of the three great Branches of the Science which
the Royal Society was established for the Promotion and Improvement
of under the Name of Natural Knowledge. We doubt not but it will
appear from the following Chapter that this venerable Body has at all
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A N I M A L S.

ZOOLOGY is one of the three great Branches of the Science which the Royal Society was established for the Promotion and Improvement of, under the Name of Natural Knowledge. We doubt not but it will appear from the following Chapters, that this venerable Body has at all Times had, and still has, as much Knowledge of this as of either of the other two.

PART VI. BOOK I.
Of SUBJECTS relating to the HUMAN
SPECIES.

CHAP. I.
An Account of a Mer-Man.

IT has for some odd Reason, not easily comprehended by the gentle Reader, pleased the Writers of Miracles and Monsters in the Animal World, to make them almost all Females: The Creature described, as being of the Human Species, and living under Water, has been almost always made a Female by these Gentlemen, and distinguished in our Language by the Name of the Mer-maid: We have an Account in the Philosophical Transactions, however, of one of these Creatures, which is, contrary to this general Custom, declared to be a Male. It does not appear indeed from any Part of the Account, tho' particular enough in most Respects, that the Author of it saw any Thing about the Creature that might determine its Sex, but however as he has all along spoke of it in the masculine Gender, we think it is as fairly and fully proved that it was a Male, as that it was a Fish. The Author of this marvelous History is Mr. *Thomas Glover*; it stands in the hundred and twenty-sixth Number of the Philosophical Transactions.

Mr. *Glover* tells us, that the Creature appeared to him in *Rapakannock* River in *Virginia*, and that he had so many and so favourable Opportunities of examining its Figure, that he is qualified to give a very good Description of it. It was larger, he tells us, than a Man, otherwise like, its Skin tawny, like that of the Inhabitants of that Country; its Head pyramidical and without Hair; its Eyes large and black, its Eye-brows broad; its Mouth wide, with a black Streak at the upper Lip, and turned up at the End like Mustachios; its Neck, Shoulders, Breast and Waste, like a
Man;

Man; but its Tail like that of a Fish. Mr. Glover informs us that it played about in the Water near him, and looked him in the Face: that its Aspect was *very grim and terrible*, and that it dived and rose up again, and sometime swam just under the Surface of the Water, at which Time he could observe it throw out its Arms and draw them in again *just as a Man does.*

The Love of telling strange Stories has existed in all Ages; and we have consequently had many Accounts of Mer-maids, if not of Mer-men, delivered by different Authors. *Thomas Bartholin* has described one under the Name of a *Syren*; *Barewitz* another which he swears he saw himself, under that of a Sea Man; and twenty other People not worth naming, have told us twenty other Falsities not worth commemorating about it. It is to be observed however, that this Transaction Author differs from them all in the Description of the Creature; they have probably copied after one another in this Case, as they have done in the Description of the Unicorn; but Mr. *Glover*, who has very honestly described nothing but what he saw, differs evidently from them all in his Account, and we would recommend it to the future societarian Zoologists to consider the Mer-man of Mr. *Glover* and that of the other Authors, as two Species at least, if not as two distinct Genera.

They all describe theirs as having Hands like a Man, and a round Head, this Author frankly acknowledges that he does not know whether he had any Hands at all, and remarkably differs about the Head. The Tail described we are apt to believe was formed out of Mr. *Glover's* Fancy, from the Dashing of the Water at the Creatures plunging down. As to all the rest, we appeal to the whole World, whether his Description so far as it goes, is not very accurate: It appeared soon after the Publication of this Transaction, that the Creature was no other than an *Indian* of the Country diverting himself with swimming, and with a high Cap upon his Head made of split Wood, in the Manner of our Basket Work to keep up his Hair.

CHAP. II.

Of the making of Rain.

AMONG the vast Number of Arts communicated and improved by the *Royal Society*, there is not one perhaps which would be more to the Advantage of the Farmer and the Gardener than this, provided it could be of a limited Kind, and extend no farther than it was desired to do.

The Art itself is of *Indian* Origin, and is communicated in the hundred and twenty-sixth Number of the *Philosophical Transactions*; the World is indebted for it to the very ingenious Mr. *Thomas Glover*, the Gentleman who is immortalized in our last Chapter for taking a poor *Indian*, who was bathing in a River, for a Mer-man. The Method is no more than this; when any particular District wants Rain, the Inhabitants make their Complaint to the Priest, who goes into a private Cabin, and as the Author assures us, causes a very plentiful Shower. The Name he gives to this Ceremony, is, that we have chosen for the Title of this Paper, *the making of Rain*. We cannot but think that the *Royal Society* prove themselves to be of about the same Share of Understanding with the wild *Indians*, by their believing it: But if ever they should find the Way to bring it into Practice in this Part of the World, we would highly recommend it to them, to take Care of limiting the Showers to the Lands of the People who want them, for fear we should not in general know quite so well how much of it is proper for the Whole, as the great Power who at present has the dispensing it.

CHAP. III.

A true and accurate Account of an Hermaphrodite.

THE World has been at all Times fond of listening to miraculous Accounts of Things out of the Course of Nature; among these the Histories of the Hermaphrodites have long had a first place. We are not

to wonder that People, unacquainted with the Structure of a human Body, and the Laws of Nature in its Formation, should credit Impossibilities concerning it; and we find the *Royal Society* of *London* on this Occasion, taking the same Steps as on all others where the World was dubious, to establish Truth and Certainty on the Subject.

We are sensible that there have been from Time to Time some few People who have not credited the Stories of this Kind, however well attested, but we flatter ourselves that since this learned and judicious Society took the Subject into Consideration, the Race of Unbelievers have vanished. If any one at that Time doubted which Way to determine in so nice a Point, the Account that is to be the Subject of our present Animadversions must needs have *determined* him: It stands in the thirty-second Number of the Philosophical Transactions; its Author is *Dr. Thomas Allen*.

The ingenious Doctor does not chuse to call the Subject of his Dissertation a *Lusus Naturæ*, he mentions that Term indeed, but it is only to condemn it; he boldly charges Nature with a worse Fault, he says his Subject was an *Error* of hers, and that of a very extraordinary Kind.

He tells us, that he had an *Opportunity of seeing* a Person, whom some foolish Parson had christened *Ann*, not foreseeing that the Child would, according to the Doctor's Account, soon after have at least as much Right to *John* or *Thomas*; or, that what at that Time appeared a Female, was not to continue so above five or six Years.

The Doctor informs us, that from her Birth to the Age of about six Years, she was an *evident Girl*, such as the Parson had taken her to be; but that about that Time an Accident gave the first Hint toward the thinking she would be a Boy soon after, for that in *wrestling* with some of her Playfellows she brought down *two Tumours* like Hernias or Ruptures. He tells us, that proper Assistance was immediately had, but that the Surgeons were unable to *reduce* these Ruptures, for that they were in Reality *two Testicles*, like those of a Man in all Respects, except that both were not included in one *Scrotum* as in Men, but each had its *Scrotum*, and that these two *Scrotums* made the two *Labia of the Pudendum*. He adds, that the *Nymphæ* and *Carunculæ Myrtiformes* appeared entire, and that half the Aperture of the *Vagina* was covered with a Membrane from the *Perinæum*. There was no appearance of a *Clitoris*, he says, but the *Uterus* and its Neck were exactly like those of a Female. The Doctor

Doctor tells us, that she passed for a Female, notwithstanding her Testicles, till the Age of thirteen, at which Time, as she was *kneading of Dough*, a *Penis* burst forth all at once, and convinced the Patient that she must change her Petticoats for Breeches. He informs us, that this *Penis* in an Erection was about *four Inches long*, and its Situation the same with that of the *Penis* of a Man: And that it had a Glans and *Preputium* fastened to the *Frænum* in the same manner as in Men, but that the Glans was imperforated: the Doctor seems to be in a Humour to have helped Nature as to this Error, by making a Perforation; for he tells us, that there was only a thin Membrane in the Way, which might have been easily got thro': For want of this little Assistance, however, he tells us, that the *Semen* could never make its Way out of the *Penis*, but was discharged thro' the *Pudendum Muliebre* in a reflux Manner.

Such is the Account given by Dr. *Allen*, of an Hermaphrodite then publickly to be seen in *London*. We must acknowledge it to be punctual and particular enough, but we would be glad to enquire how the Doctor got all his Information before we pay too full a Credit to it. As to the Error that he taxes Nature with, we are almost ready to quarrel with him on that very Head, and to doubt Nature's having any Hand in it; we are very certain that Women, formed as perfectly such as any Women in the World, have made themselves as much Men as this Subject of the Doctor's was, by a continued practice of perverting her Intentions: Frequent Titillation will in many Subjects make the *Clitoris* grow longer than it would naturally have done, and what did Dr. *Allen* see but a Woman with a long *Clitoris*.

In his Description of the Parts, which is indeed nice and accurate to a Miracle, we find him describing a perfect Female, and are very well certified by his own Account, that the Person was as evident a Girl when he saw her, as she was at six Years old, before the Appearance of either *Penis* or *Testicles*, as he calls them. We should be glad to know however in what Manner the Doctor became informed of certain Particulars of it, such as the Situation of the *Uterus* and its Neck. We are apt to believe, with him, that they were as in other Females, but how he got Sight of Parts so impossible to be seen, is a Sort of Obscurity that wants clearing up. As to the *Penis*, we have declared it to be no other than a long *Clitoris*, the Doctor's own Description of it proves as much; but how he could be assured of what he calls

Scrota and *Testes*, being truly such, we again are at a Loss to account; that he had not an Opportunity of dissecting them is pretty certain, because the Subject was at that Time alive, and continued to be so many Years afterward, when she was seen in *Holland* by *Diemberbroek*, who gives a very different Account of her. For our own Part, we are apt to believe that the *Labia Pudendi*, a little swelled, passed upon this discerning Gentleman for *Scrota* and *Testes*.

The Doctor then it seems had no Opportunity of knowing, with any Degree of Certainty, some of the Things he tells us of, nor of knowing some of the others at all. He describes the whole *Pudendum Muliebre* as perfect, but without a *Clitoris*: It is vastly to his Dishonour to have seen a Body of such Dimensions hanging out of it and furnished with its Glans, &c. and imperforated, without finding that it was a *Clitoris*; what he calls a *Frænum* was undoubtedly the Extremities of the *Nymphæ*, and nothing more; and as to the rest, his own Description and every Circumstance prove it to be a very *Clitoris*, altered from the common Form in nothing but that it was longer than usual.

The Doctor delivers his History of the Woman as punctually and particularly as the Structure of the Parts, but perhaps it would not have been improper if the Society had enquired on what Foundation: The Answer would have been, that he had it from the Man who shewed her to People for Money: A Man who could not know any thing of the Circumstances he related, and whose Business it was to tell as strange a Story as he could. The Truth of the Affair, in all probability, was, that the Girl had gradually encreased the Length of the *Clitoris* by lascivious Practices; or that it had by Degrees grown to this Size of itself: one of these was unquestionably the Truth, but neither of these would have made so miraculous a Story, or given the People she was shewn to so great an Opinion of her being a Miracle of both Sexes. The Diversion of *Wrestling* was excellently pitched upon for the Means of bringing down the *Testes*; it not only gives us an Idea of violent Motion, but is of the masculine Turn, and gives a Prefage of what was to be the Sex of the Person. The sudden Appearance of the *Penis* is another Circumstance finely suited to make the Rabble stare, but we think the believing it does not do much Honour to the Doctor, or to the Society to whom he repeated it. Upon the Whole, the Account of the Parts is evidently that of those of a Woman, but given by one who did not understand them; and the History of the Woman is taken upon Credit from

from a Man whose Business was to lye, and whom we would be apt to imagine no Doctor in the World but Dr. *Allen* could have believed.

He adds to this, that at sixteen her Menfes began to flow, and continued to do so regularly for two Years, but that they then stopped, and she then began to have a Beard, and Hair on her Breast and other Parts of her Body like a Man; that the *Thorax* became broad, and the Breasts small, and in short all her other Parts became perfect masculine, her Voice not excepted, which now was loud and hoarse. This sounds very marvellous, and one would think might have warranted the Person who shewed the Subject, to say not only that she had some of the Parts of a Man, but that she was absolutely changed from a Woman to a Man: This however is about as true as the rest. We meet with an Account of the same Hermaphrodite from *Diemerbroek*, as before observed, some Years after this, but she was then as much a Woman as ever, and we find by that Author, who is a somewhat more accurate one than Dr. *Allen*, that her Menfes flowed at that Time, and that she had below the *Clitoris*, for so he calls Dr. *Allen*'s *Penis*, the *Meatus Urinarius* and *Vagina* properly situated and natural. *Diemerbroek* was as much in a Humour to prove even the Emission of a seminal Matter from these enlarged *Clitoris*'s of Women as any body could be, but he was an Anatomist and an Author of Credit, he would not describe any Thing but what he saw, nor call any Thing by any other than its real Name.

We have seen in *London* several Subjects called Hermaphrodites since the Time of Dr. *Allen*, and they have all been found to be what this was, Women whose *Clitoris* was longer than ordinary, and nothing more, except that in some of them, this Membrane, which in Dr. *Allen*'s Subject covered only a Part of the Orifice of the *Vagina*, has covered nearly the Whole: Female Children are often born with this Membrane covering more or less of that Part, and every Midwife at this Time knows that it is of no Consequence and that no more is necessary to make all right than to cut it down with a Pair of Scissars.

The Doctor tells us, that this Hermaphrodite, as he calls her, had the Passions of both Sexes; it is a thing he could only be informed of on Hearsay, and is so natural a Circumstance, that nobody, who ever shewed an Hermaphrodite, ever missed it: Those who have been shewn under the Name of such lately have been all taught to tell us that they had more Passion for Women than for the other Sex; as to Dr. *Allen*'s we have an unlucky Proof in his own Account of her having the Pas-

Passions of a Woman ; for he tells us of her falling violently in love with a Man at Sight, getting into Hysteric Fits about it, and being cured by a Galbanum Plaister and the like Remedies ; but we have an Instance yet stronger of her conceiving an equal Passion for the same. A Love Fit that took her afterwards in *Flanders* we find required another Sort of a Remedy. The Consequence was the spoiling her, in a great Measure for an Hermaphrodite, she was helped to a fine Girl by it, whom as the Sequel of the History informs us great Pains were taken to make into an Heramphrodite too, and probably would have succeeded, had not the little Lady died before she was perfect enough for shewing.

The World may see by this famous Paper and our Observations on it, the real Use of the Transactions of the *Royal Society*. The Authors of them, however little they are able to conclude rightly from Facts, frequently relate Facts, if not faithfully, at least in such a Manner, that, allowing for their Prejudice, we may judge very properly from them : They often mix Matter of mere Hearsay indeed with Observation, but a judicious Reader will always be able to separate these, and when he finds in the plain Facts, Things that perfectly make against the System the Author inserts them to advance, he may pretty fairly conclude that they are given in very Simplicity ; and are Truths that he may depend upon. However false Conclusions Dr. *Allen* may have drawn from the Facts he lays down in this Paper, the Facts themselves serve our Turn to prove the contrary to what he intended to make out by them. They perfectly convince us that what he means to describe as an Hermaphrodite was not an Hermaphrodite, but a meer Woman ; and as some other Authors, who saw this Person before her unlucky Disaster, have also described her as an Hermaphrodite, we are taught by them to form a better Idea of the Judgment and Candour of these Writers than we could otherwise have done ; as well as to judge with more probability of the Accounts of all the other Hermaphrodites in the World. Thus it is always in regard to the Works of great Authors ; they serve to explain one another.

CHAP. IV.

Of People not born to be drowned.

IT has long been an established System, that People in whose Hearts the *Foramen Ovale* remains open, must die some other Death, not by drowning. Systems, however, are never of so much Weight as when established upon Facts, and strengthened by subsequent Proofs of the same Kind. The *Royal Society* of *London* never find any thing necessary, but they find Means to do it. We meet with several Instances of People living a long Time under Water; among the other Miracles handed down to Posterity in their Publications, one of them so late as in the four hundred and fifty-fourth Number, communicated by Dr. *Green*. We are to do the Doctor the Justice, however, to acknowledge, that he only relates what he heard on the Subject, and gives you his Authors that you may judge for yourselves, how much Dependance is to be laid on them. We are informed in this Paper, that a Girl unluckily falling into the Water at a Mill-Head, was drawn under the main Wheel, where stopping the Motion of the Wheel, she lay fastened by the Leg beneath it, and flat upon her Face under four Feet and a half Water, a quarter of an Hour, without receiving any Hurt by it; and that when the Miller had looked about all that Time in vain, to find what stopped his Wheel, she informed him of the Cause by crying out lustily, pray help me out! for God's Sake help me out if you can! The Fellow we are told no sooner found her Situation, than he found Means to get her out; and we are assured she was very brisk after the Accident: She died, indeed, some Days afterwards of the Hurts she had received, during her lying under the Water; but it is clear enough that Drowning had no Share in her Death.

The same Story sometimes makes a very different Figure as it gets into different Hands: There are not wanting People who assert, that the Girl, who is the Subject of this History, did not lie under Water quite a Minute, and that she did not cry out for Help till her Head was above the Surface, her Leg being at that Time held fast by the Wheel: But this would be taking all the Miracle out of the Story, and rendering it not worthy the Attention of so wonder-loving a Body as the Account is addressed to.

As to the Author of the Relation, we have no Right to charge him with any Assertion about it : He gives us the Story from the Miller, and signed by the Miller and his Family ; he is not the Author, indeed, but the Transmitter only of the Account, a Circumstance, that it would be well to attend to, in Regard to many of the Papers in this wonderful Collection : But if the Doctor himself had asserted it, where had been the Reason to suspect the punctual Veracity of the Relation, when we have in the three hundred and thirty-seventh Number of the same Transactions, an Account of a Woman that lay six Days buried in Snow, without receiving any Harm by it ; and another in the hundred and eighty-third Number, of a Man who happening to slip thro' the Ice which was over a Canal, was found two or three Days after standing upright upon his Feet at the Bottom, and taken out without having received any Harm, after he had been there all that Time very peaceably amusing himself with listening to the Bells of the next Town.

In short, we would advise the present Members of this renowned Society never to be afraid of repeating strange Stories, for that it will not be easy for them to exceed in Strangeness those that stand upon Record in the Transactions, and that as to the Reception of them in the Reading, the Course of the Meetings for these many late Years has abundantly proved, that the highest Tincture of Improbability is the surest of all Recommendation to them.

PART

PART VI. BOOK II.

Of BIRDS, the Origin and Nature of which are delivered in the PHILOSOPHICAL TRANSACTIONS.

CHAP. I.

Of the Production of Geese out of Shell-Fish.

Ignorance is the great Parent of Miracles; the World ought not, therefore, to wonder, that they find more of them in the Publications of the *Royal Society of London*, than in any Works of equal Quantity: We could pardon, however, Errors of Opinion in these Authors; what we are most provoked at, is the frequent Assertions we meet with there, of Things that are impossible; Histories of Facts that cannot have happened, and Accounts of Things that never did, or can exist, delivered by People who pretend to have seen and examined them.

It is with this View, that we shall be more than ordinarily severe on Mr. *Beaumont*, who describes growing Entrochi of a Foot long; and we cannot but be of Opinion, that the Author of the Account now under Consideration, deserves also the utmost Censure and Contempt, from every body who knows any thing of natural History, or who wishes to know any thing of it.

The western Isles of *Scotland*, and some other Parts of the *British* Dominions, are abundantly stored, at certain Times of the Year, with a Bird of the Goose Kind, commonly known in those Places by the Name of the Brent-Goose or Barnacle. These Birds rarely breed with us, however, but seek for their sitting Season, Islands, that are less frequented than the Places where we find them so common. The feeding

ing the Birds so frequent, and yet never finding any of their Nests, induced ignorant People to believe that they never had any; that they were not bred like other Birds, but in some different Manner.

About the Shores of the very Places where these Birds are most frequent, there are found also in vast Abundance, a Species of Shell-Fish, peculiar for certain filamentous Substances, frequently seen hanging out at it. The ignorant Fishermen, who found these Shells in abundance affixed to rotten Wood and dead Trees, that were floating in the Water, or lodged by it on the Shore, soon found the Way to confound the filamentous Substances which hung out of them with Feathers, and persuaded themselves, that the Geese, whose Origin they could before by no Means make out, were bred from them, instead of being hatched like other Birds from Eggs.

So strange a Fact could not long be a Secret; the whole Kingdom was acquainted with it, and as Miracles always acquire more Strangeness in the Telling, the Trees floating in the Water were soon converted into Trees growing on the Shore, and the Shells affixed to them were said to be their Fruit. Thus arose the first fabulous History of the Barnacle, which was, that a peculiar Tree growing in those Parts of the Kingdom, produced Fruit, which, if they fell on the Land perished; but if they fell into the Sea, which Providence seemed to have meant, by making the Trees always grow on the Shore; then they by Degrees opened, and let out every one a young callow Bird, which by Degrees getting Feathers, grew to be a Brent Goose: Others, however, quarrelled with the Account of the Fruit's falling from the Tree whole, declaring that it always opened while on the Tree, and the young one dropped out: The little Goose, if it fell into the Water, was safe; but if on the Land, it had seldom Strength enough to waddle to the Water, but perished soon after its Birth from the Fruit.

Numerous Accounts were given of this, attested by People willing to give their Oaths that they had seen it, and the wise World long believed it, and received the little Difference as to Circumstances, as a Proof that the Fact itself was indisputable.

People, who after this visited the Places, and found no such Tree growing there, but were informed of the vulgar System received there, as to the Origin of the Birds, proud of an Opportunity of rectifying the Errors of their Contemporaries and Rivals in Fame, declared the utter Falsity of these Geese being produced in the Fruits of Trees; and asserted,

serted, that they were the Produce of certain Sea Shells, which grew not upon growing Trees, but upon old Planks or decayed Wood of any Kind. The proved Falsity of the first Miracle about these Birds led People to suspect that there was not much more Dependence to be placed on the other: The Truth was clearing up apace, nay, People went so far as to call them Fools who had believed any thing but that they bred elsewhere, and only came to feed where they were seen with us, when the grand Champion of Errors, the *Royal Society*, engaged in the Dispute.

Sir *Robert Moray*, a favourite Member of that Body, made a Journey on purpose to enquire into the real Origin of these Birds: He brought up an Account with him that settled the World in an Opinion that they were really the Product of a Shell-Fish, and that these little Philosophers, who had attempted to argue for their being hatched out of Eggs, had imposed upon their Ignorance. This noble Knight tells us in his Account, which is printed in the hundred and thirty-seventh Number of the Philosophical Transactions, that every thing he relates he was an Eye-witness to. That he found on the Shores of this Island a dead Fir-tree without its Boughs, whose Length and Diameter he gives us with the same Accuracy that Mr. *Baker* does that of a Pill-Box. The Trunk of this Tree had been covered all over with the Shells which breed these Geese, he tells us, but at the Time when he saw it, the greater Part was decayed, and only its underside furnished some; many of these he opened, and, to repeat his own Words, *he found in every one that he opened, a perfect Sea Fowl: The Bill, he tells us, was like that of a Goose, the Head, Neck, Breast, Wings, Tail and Feet like those of other Water Fowl; the Feathers, he adds, were every where perfectly formed, and of a blackish Colour, as were also the Feet.*

The World at this Time did not know the Character of the *Royal Society* so well as it does at present: People believed the Members of it to be a Set of sensible honest Men: And what could happen in Consequence of such an Account from such a Body, but a general Belief that this was a Fact, and that the Geese were in reality thus bred. But what were they to think of the Credit of this Author, and of the Society who countenanced him, when they found a Man of very different Credit, Dr. *Tancred Robinson*, afterwards assuring them on better Testimony, that the Brent Geese were bred like other Geese from Eggs sat on by the Females, and

that this Shell, pretended to contain them, had really nothing in it but a Fish, as Oysters, Cockles, and all other Shells?

As to the Certainty of the Bird being hatched like other Geese, we have not only our Reason to inform us that it must be so, but we have Accounts of *Dutch* Sailors, who have found immense Numbers of their Nests with the Females sitting on the Eggs, and the Young of somewhat forwarder Broods running about them, and since that, they have been known to breed even with us.

As to the Shells, nothing is more certain than that the Knight never saw any one of all the Things he describes in them; no Bill no Feet, no Head nor Tail of a Goose, nor any real Feathers, but only a peculiar Animal destined to live and die in them, as all other Shell Fish do; and fixed by a peculiar membranous Neck, to the Wood it adheres to, by which the wise Sir *Robert* supposed that it took in the Nourishment.

It is a very peculiar Species of Shell Fish; its Shell is not composed of two Pieces or Valves as is the usual Case, but of five, two of these are larger than the rest; to these are affixed two small ones, and finally the fifth Piece is long, slender and crooked, running down lengthways, and covering the Joinings of the other Pieces on that Part. The Shape of the Whole is triangular and flatted, its Colour a blueish white, sometimes with a Cast of reddish. By this Description we may see how very accurate Sir *Robert Moray* was, who tells us the Shell-fish is like a Muscle. It is fixed to the Wood by the hollow cylindrick Body before-mentioned, which it can extend or shorten at Pleasure; this much resembles a small Gut, and is usually full of a glarious Liquor; it is composed of two Membranes, an external one hard and brown, an internal one soft and of an Orange Colour. The larger Portions of the Shell open and shut in the Manner of the Bivalves, the others by being moveable by means of their membranous Attachments give way to the Opening of these more easily, and in any Direction, and to the Motions of the Body of the Fish. The Clusters of Filaments, which are what the wise Knight took for Feathers, are a Part of the Body of the Fish, they are placed in a Range on each Side, fourteen in Number, and each divided into two. They are a Kind of Arms that Nature has allotted it for the catching its Prey, and are therefore placed so as to surround the Mouth of the Animal, which is situated between them, and consequently easily receives what they thrust toward it.

Thus

Thus much might serve for the explaining the Matter of Sir Robert Moray's Barnacle, but as we are upon the Subject; it may not be amiss to look into the Accounts of the same Kind which we find in others, and to set right the Whole.

Honest *John Gerard*, in writing a History of Plants, could not deny himself the Pleasure of giving the History of the *Goose Tree*, as it may very well be called, if we refer to the Authors who have written on it. He closes his Book in a very pompous Manner, with the Description of it, and, like Mr. *Arderon* on the Disposition of the Strata, praises and honours God's Name for it: What Honour ought a rational Creature to have for Authors who have dared to address his and their Creator with false Praise, on a Subject that does not exist, and that would but have prevented the Order of Nature if it had!

Gerard, after an ample Preface, in which he tells us that the subsequent Relation contains nothing but the naked and bare Truth, gives first the History of the Tree that bears the Geese, and afterwards an Account of another Sort of Shell, which he tells us produces the same Sort of Bird. He very gravely assures us, that he shall beware of false Accounts, but that *what his Eyes have seen and his Hands have touched, that and that only he shall declare*. He tells us, that in the Pile of *Foulders*, an Island on the Coast of *Lancashire*, he saw these Shells and the Birds in them in their different States, some very young, others ready to come out, and others hanging by the Bill, as well as some full grown, which he also describes; to this he adds, that if any doubt the Truth of any Part of the Story, let them repair to him, and he will satisfy them farther, by the Testimony of good Witnesses. It is an acknowledged Point in Matters of Law now, that any Thing may be proved by Evidence, whether true or false; but we are to do the due Honour to *Gerard* by reminding the World, that this is no new Discovery, but was known in the Days of that Author.

After this History of the Barnacle of Sir Robert Moray, *Gerard* goes on to give us an Account of another Kind also of his own Knowledge, nay of his own particular Discovery. This he found, he tells us, between *Dover* and *Romney*, and he describes it as a long crimson Pipe like a Bladder full of Juice, and having at its End a Shell Fish like a small Muscle but whiter. He tells us, that he gathered a great Number of these, and on opening them, found that they were all Goose Shells; and discovered the young Birds in them, as he tells the Story him.

himself, in all their States and Degrees of Maturity; in some he says there was only a shapeless Mass of Flesh, in others the same Mass grown into the Form of a Bird, but naked; in others more mature, the Bird covered with Feathers, and ready to fall out of the Shells.

We are very ready to allow, that honest Mr. *Gerard* saw Geese in these Shells as much as his Friend Sir *Robert* did in the others: They are another Species of the same Genus of Shells, differing only in the Largeness of the Neck or Tube by which they are fixed to the Wood, the Number of Pieces the Shell is composed of is the same in all, and the Structure of the Fish with its Filaments the same.

The Authors who have written on Shells, have described three Kinds of the *Conchæ Anatiferæ* but this has escaped their Observation, tho' we can do *Gerard* the Justice to say that he is honest in the Description of it, as we have found it on our own Coasts. Its Neck or Tube is as thick as a Man's Thumb, very clear and transparent, and full of a reddish Fluid.

C H A P. III.

Of the Place to which Birds of Passage retire.

THE Observation that certain Kinds of Birds appear among us regularly at certain Seasons, and at other leave us again as regularly, has occasioned many Guesses in the Naturalists as to the Place to which they retire. One of the first Opinions was, that when they flew from us they went to other Kingdoms, where the Temperature of the Air was such, as it had been, but was at that Time ceasing to be, in the Places whence they departed; and where the Food, which was becoming scarce in those Places, would be found in sufficient plenty. This however was soon bantered out of the World, and Philosophers started a Variety of other Opinions; some, that they really did not leave us at all, but only hid themselves in Holes of the Earth, in hollow Trees, or *under Water*, and there went quietly to sleep, till the proper Season for them waked them again; others declared for their absolute leaving not only the Kingdoms from which they disappeared, but even the whole Globe of the Earth, and that they retired to the Moon. The Philo-
sophical

sophical Transactions however, furnish a new System ; we owe this to the never enough to be celebrated Dr. *Mather* ; it stands in the three hundred and thirty-ninth Number of those egregious Works. This Author, out of Humour with all the Worlds we are acquainted with as Places of Reception for these winged Itinerants, has found out a new one for them, declaring it as his particular Opinion, that there is an undiscovered Satellite accompanying this Earth at no great Distance, to which they all retire at their stated Times, and in which they remain till the Season of their visiting us again.

We would earnestly recommend it to the present Members of the *Royal Society* to give us some farther Account of this invifible World.

I. C H A P. I.

Observations on the internal Parts of Fishes.

THE Anatomy of Fishes is a Subject of the greatest Curiosity, and one that has been the least looked into of any in the whole Animal World. But it is treated in the Paper of Dr. *Parker*, which falls under our Consideration in this Place, too much in the former Way. This stands in the two hundred and twenty-fifth Number of the Transactions, and as it has never been contradicted, unadverted upon, nor added to, in the long Period of Time that has passed since its Publication, it is natural enough to conclude, that it is what is known, and all that is known to the Society at this Time.

The Doctor is, after the Manner of Translation Writers, somewhat too positive ; his principal Assertions are, that, 1. Fishs have no Lungs or Respiration. 2. That the Heart has but one Ventricle. 3. That their Blood is made many Windings. 4. That the Liver and Spleen are joined together. 5. That they have Kidneys, Bladder, &c. 6. That they have an Air Bladder, serving to make them move or less heavy, as they compress or dilate it.

PART

Now, if we except his Account of Fishes dying when out of Water because the Nitre of the Air and the Nitre of the Water are different in their Sublimity and Purify, and some other Assertions of a like Kind, is the Substance of a long Paper on so interesting and curious a Subject as this, it is our Business to correct its Errors, and supply its Defects. As

PART VI. BOOK III.
OF ICHTHYOLOGICAL DISSERTA-
TIONS on general Subjects, contained in the
TRANSACTIONS of the ROYAL SOCIETY.

CHAP. I.

Observations on the internal Parts of Fishes.

THE Anatomy of Fishes is a Subject of the greatest Curiosity, and one that has been the least looked into of any in the whole Animal World. But it is treated in the Paper of Dr. Preston's, which falls under our Consideration in this Place, too much in the societarian Way. This stands in the two hundred and twenty-fifth Number of the Transactions, and as it has neither been contradicted, animadverted upon, nor added to, in the long Period of Time that has passed since its Publication, it is natural enough to conclude, that it is what is known, and all that is known to the Society at this Time.

The Doctor is, after the Manner of Transaction Writers, somewhat too positive; his principal Assertions are, that, 1. *Fish have no Lungs or Respiration.* 2. *That the Heart has but one Ventricle.* 3. *That their Intestines make many Windings.* 4. *That the Liver and Spleen are situated as in other Animals.* 5. *That they have Kidneys, Bladder, &c.* And, 6. *That they have an Air Bladder, serving to make them more or less heavy, as they compress or dilate it.*

This, if we except his Account of Fishes dying when out of Water because the Nitre of the Air and the Nitre of the Water are different in their Subtilty and Purity, and some other Assertions of a like Kind, is the Substance of a long Paper on so interesting and curious a Subject as this: it is our Business to correct its Errors, and supply its Defects.

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As to his first Assertion, it is not true of all Fishes; for the Cetaceous Kind have all Lungs and Respiration. His second is of the same Kind, and requires to be understood with the same Limitation; for all the cetaceous Fishes have two Ventricles in the Heart, as other Animals that respire have: To this Article may also be added, that the Situation of the Heart in all Fishes, is in the Breast pretty high, in those that have Gills but at very small Distance under them; and that it is contained usually in an extremely thin Membrane or Pericardium; and tho' but small, in proportion to the Bulk of the Animal, yet it is situated in a large Cavity. Its Figure also is very different in different Fishes; in the far greater Number it is quadrilateral or square, and in some, as in the Bream Kind, it is of a semicircular Figure, and somewhat flattened. Its Position also is singular, being transverse, with Regard to the Head, not longitudinal. Its Parietes are always thick and strong, and as in all Fish that have Gills, it has only one Cavity or Ventricle; it has also only one Auricle, but this is very large, and is placed on the upper Part of the left Side. At the Insertion of this, there are two Valves, one above, one below it; and in its lower Part, it surrounds the Receptacle of the Veins, which has also at its Insertion into the Auricle two little Valves like Eyelids. The Aorta adheres to the Base of the Heart; it is in this Part very small, and has two Sigmoidal Valves in it; but at a little farther Distance it swells into a Sort of Belly, and is white on the Outside, and has a Number of fleshy Columns within it. From this Place, the Aorta grows smaller again, forming a kind of Cone, and afterwards running to the *Branchiæ*; it first sends one Branch to each of the Semicircles, or to each distinct *Branchia* on either Side. Each Branch is soon after divided into four, and these running along the Base of every Leaf, are subdivided into as many Ramuli, as there are Laminulæ on the Branchia; and finally, they entirely disappear at their Extremities.

On the Rim of every one of these Laminulæ, there is a Vein, which empties itself into a general Trunk, running along every bony Semicircle; and in fine, each of these Veins, going from its Semicircle, joins the rest; and together they form a common Trunk, which is considerably large, and runs along the Spine, performing the Office of *Aorta Descendens*, distributing the Blood to every Part of the Body of the Fish. The Vein of the first Semicircle of the *Branchiæ*, is first carried into the Head, carrying Blood to the Brain, and to the Organs of Sensation;

and then descending again, it joins with the Vein of the next below it, for the forming the Trunk. As to the Intestines of Fish, the Doctor's Assertion, that they make a great many Windings, is of the Number of those which Men make who are very little Masters of their Subject. No single Character can be given of the Intestines of Fishes, they differ extremely in the different Kinds of Fish, in regard to their proportional Length, Figure and Disposition.

In many *Genera* the Intestine is one strait Canal, running immediately from the Stomach to the *Anus*. It is thus in the Conger or Sea Eel, in the Lamprey, in the Needle-Fish, in the Sudis, and in the Cobitis. In many others it is once turned towards the upper Parts, and has no other Circumvolutions: It is thus in the Bream, the Grayling, the Smelt, the Salmon, the Pike, the Pearch, and a great many other Fishes.

In others it is variously convoluted, or has, as the Doctor expresses it, many Windings, as in Quadrupeds: It is thus in the Dolphin, the Sword-Fish, the Mullet, and some others: It was somewhat unlucky, however, that the Doctor should take his up general Character at random, from some one of these, when the far greater Number of Fish differ essentially from them in the most remarkable Manner, in the Construction of the very Part he is endeavouring to ascertain the Figure and Disposition of.

The Intestine in Fishes differs not less in the various Kinds in Length, than in its Disposition; in some it is not so long as the Body, as in the Lamprey, and Stittleback; this is a pretty singular Circumstance, and therefore the very ingenious Mr. *Arderon* has taken care, not to point it out, in his History of the latter, published in the Philosophical Transactions. In others, it is of about the Length of the Body, as in the Bream, Roach, and others of that Kind; and finally, it is in others much longer than the Body, as in the Dolphin, Mullet, and others, that have it disposed in many Folds and Windings.

The Liver of Fishes also deserves a very different Account, from a Man who writes upon the internal Parts of them, from that given by the Doctor. It is usually very large in Proportion to the Body, and in general is situated in the left Side of the Abdomen; but this Rule is not universal; and it differs in the several *Genera* also extremely in Figure and Proportion: In some it is single and undivided, as in the Lamprey, the Grayling, the Salmon, the Pike, the Sun-Fish, and in all the flat Fish.

Fish. In others, it is divided into two *Lobes*, as in *Pearch*, in *Sharks*, in *Eels*, in most of the cartilaginous *Fishes*, and in the *Dolphins*: In others, finally, it is divided into three *Lobes*, as in the *Bream*, and all the *Fish* of that Kind, in the *Rays*, in the *Tunny*, the *Monk-Fish*, the *Stittleback*, and many others. In some, it is nearly of the whole Length of the *Abdomen*, as in the *Bream Kind*, the *Stittleback*, and many others: In others, it is much shorter than this, as in the *Pearch*, the *Shad*, the *Salmon*, the *Pike*, and in general, in the greater Part of *Fishes*.

The *Liver* in all *Fish* has a *Gall Bladder* annexed to it; but this is connected and situated very differently in the different *Kinds*. In some, it is immersed in the very Substance of the *Liver*; this is the Case in all the cartilaginous *Kinds*: In others it is placed under the *Liver*, as in *Pearch*, *Pike*, *Breams*, and indeed in the greatest Part of the *Fish Kind*; in others, finally, it is only connected to the *Liver* by a long *Neck*, as in the *Conger* and *Eel Kind*.

As to the *Spleen*, it is subject to much less Variation than the *Liver*; it is usually situated in the left Part of the *Abdomen*, near the *Stomach*. Its Figure is usually triangular, sometimes simply oblong; its Colour always darker than that of the *Liver*.

As to *Kidneys*, they are extremely different, in the different *Genera* of *Fishes*, in their Figure, Situation, and Proportion, and even in Number. They are two distinct ones, in all the cetaceous, and in all the cartilaginous *Kinds* of *Fishes*; and on the contrary, they are concreted together, and form but one Body in the spinose *Fishes* of almost all *Kinds*.

As to their Shape, they are in some oblong, and extended almost the whole Length of the *Abdomen*, as in most of the spinose *Kinds*: In others, they are shorter, and of a Figure approaching to roundish, as in the *Cetaceous Kinds*. As to their Situation, they are in some extended all along the *Spine*, as in the *Spinose Fishes*: In others, they are lodged in the lower Part of the *Abdomen*, as in *Whales*; and in Size they are as various; they are proportionably very small in the *Cetaceous Fishes*, and very large in the *Spinose*.

The urinary *Bladder* is always placed in the lower Part of the *Abdomen*, and usually lies upon the *Rectum*: There are in general two *Ureters*, by which the *Urine* is carried into it from the *Kidneys*. The

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Urethra is very evident in the cetaceous Fishes; in the smaller Fishes it is not so obvious.

Finally, in Regard to the Air Bladder, tho' the Doctor seems to deal with that as with the rest; that is, because he had found it in one Fish, to give it to all the Fishes in the World; we are to observe, that it is far from general in this Tribe of Animals; there are many that have it not at all, and in those that have, it differs extremely in the different Kinds, in Figure and Situation. It is easily distinguished, however, from all the other internal Parts of Fishes, by its being inflated with Air. There is no Air Bladder in any of the cetaceous Kinds, nor in any of the Flat-Fish or Pleurenectæ, nor in any of the cartilaginous Fishes, excepting only the Sturgeon. All the spinose Fishes have it, but they have it very different in Figure: In some it is simple, of an oblong Figure, and pointed at each End, as in the Grayling; in others it is more oblong, and more obtuse at each End, as in the Smelt and Salmon; in others it is oblong and obtuse in its lower Part; but in its upper, divided into two Parts, as in the *Lucioperca* or Pike-Pearch: In others, it is transversely divided into two Lobes, as in the Bream Kind, and many others; and in some it is divided longitudinally into two Parts, as in the Sturgeon. As to its Situation, it in many lies along the Abdomen, from the Diaphragm to the Anus, as in the Bream, Smelt, Grayling, Pike, Pearch, and the like; in others, it is situated in the upper Part of the Abdomen, and separated from the lower Part by a Membrane.

As to its Connections, it is in some Fish entirely loose and free, only adhering to the Stomach by the pneumatick Duct, as in the Bream Kind; in others it is longitudinally affixed to the Back-Bone, as in Pearch, Salmon, &c.

When the Doctor had mentioned the Air Bladder of Fishes, tho' in ever so slight and superficial a Manner, he should not have omitted the Mention of the pneumatick Duct, without which it could be of no Service to the Creatures.

All Fish that have an Air-Bladder, have also this Duct, reaching from the Bladder to the Stomach, and entering either its Orifice or some other Part of it. This differs in its Situation also, in Regard to the Air Bladder itself. In the simple Bladders, it usually arises from their upper Extremity, and in this Case, it always enters the Orifice of the Stomach: It is thus situated in the Grayling, &c. but in some Fish it takes

takes its Origin from the middle of the Bladder, tho' of the simple Kind, and terminates in the Bottom of the Stomach as in the Shad.

In those Air Bladders which are double, it arises from the Beginning of the lower Lobe, and enters the Stomach just by the Diaphragm; this is the Case in the Chub, and in all of the Cyprinus Kind.

The Use of this pneumatick Duct, is to convey Air into the Bladder, in such Quantity and Proportion, as is necessary to the several Occasions of the Fish.

In the whole internal Structure of Fishes, however, there is nothing so very singular, as certain Parts, which this Author has totally overlooked, but which are generally called the Appendices of the Pylorus. These are a Kind of *Intestinula Cæca*, or little blind Guts, and are placed about the Pylorus, and the Beginning of the intestinal Canal; they are a Kind of hollow Tubes, with no Passage out of them, and seem to assist in the Concoction of the Food. They are found in almost all Fishes, but they differ extremely in Number, Figure, and Size.

The Fish that have none of them are the Cetaceous; many of the Cartilaginous: The Pike, the Lamprey, the Needle-Fish, and some others also want them. The Ammodites, or Sand-Eel, has only one; many of the flat Fish have two; the Pearch has six or seven large ones; the Cotti or Liguri have eight, ten, or twelve; in the Herring or Anchovy they are seventeen or eighteen in Number; other Fish have twenty, thirty, or sixty, as the Salmon, eighty, as the Clupea; and others have a hundred or more, as the Sturgeon, Sword-Fish, Shark, and the like.

In Regard to their Figure, they are in some long and narrow, as in the Salmon; in others, they are thick and short, as in the Grayling, and some of the Flat-Fish. In some they are equal in Thickness to the Intestines, as in the Mullet, &c. but in the generality of Fish, they are much smaller. These singular Appendages to the Intestines, are not peculiar to the Fish Kind; they are found also in some Insects.

We shall conclude with some Observations on the Stomach of Fishes, and on the Doctor's Account of it: He says it is membranous, and that Nature has contrived it so, because it is necessary that the Fish should be able to contract it forcibly at Pleasure. It is a Reason that may satisfy a Societarian, but we are apt to believe, Nature, who is a little wiser than the *Royal Society*, would not have satisfied herself quite so easily; but on the contrary, if she had intended the Structure, and
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Matter of the Stomach, for assisting in the contracting, she would not have made it membranous. Let us look a little farther, and see what is the Use of this contracting Power in the Stomach of Fishes; why it is that it may be able to break the Food to Pieces; which Food, he tells us, is sometimes Earth. We should imagine, that granting the Doctor's Assertion, that Fish do sometimes feed upon Earth, it is the last thing in the World that would require great Force in the Stomach to break it to Pieces. But where is it that that this Author has picked up his Intelligence, about Fish feeding on Earth? unless he has it from the Societarian Account of Whales feeding on Bole Armonick, truly we cannot guess. That many Fish pick up their Food from among the Mud, is certain, and as they have no Fingers to pick every little adventitious Particle off, it is possible they may sometimes swallow a Piece of Earth with the rest; but surely, to infer from a little Dirt thus swallowed, and afterwards found in the Stomach of a Fish, that it is its natural Food, can be paralleled by nothing but the System of that worthy Member of the same Society, who finding a young Frog once under a Piece of dry Cow Dung, took great Pains to prove, that all the Amphibious Tribe were produced from the Excrements of Quadrupeds.

The Stomach is not, however, of the same Kind in all Fish, as this Gentleman would infer; Nature has indeed taken care to fit it for its several Purposes; but it is a Sort of Care very different from any thing that so truly a Societarian Head as Dr. *Preston's* could have an Idea of. She has made it extremely different in Size and Structure, in the several *Genera* of Fish. Its Situation is indeed much the same in all, its universal Position being in a longitudinal Direction, but its Thickness, internal Roughness, and Power of Contraction, are extremely different in the several Kinds. It is not indeed universally single, for the *Stromateus* or *Fiatola* has two.

It is singular, that the Stomach in living Fish is cold to the Touch, and yet it serves for the Digestion of very hard Bodies, not only of small Fishes and Earth, as Dr. *Preston* remarks, but of crustaceous Insects, and even many Kinds of testaceous Animals. The flat Fish of several Kinds, as well as many others swallowing the smaller Bivalve Shell-Fish whole, in great Quantities, and perfectly digesting them in a very short Time. It appears from this, that Heat is not quite so necessary to the Concoction of Food, as is generally supposed; but that Nature
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does much more in it, by furnishing a proper Juice to the Stomach, and by giving the Means of a continual Attrition, than by that generally supposed principal Agent.

That a very different Power of Concoction should be given to different Fish, is evidently necessary, from the very different Foods it was destined to be exerted on ; could the wise Author of Nature give the same Proportion of Force to the Stomach of the Bleak, that was destined to feed only on Worms and Flies ; and to that of the Soal, whose common Nutriment was to be Shell-Fish ; to the Chub, whose Food was to be at the utmost a Beetle or Grasshopper ; and to the rapacious Pike, who, when small Fish, Frogs, &c. are not in his Way, will seize on little Fowl and Water-Rats, for both these Kind of Foods have been found in his Stomach. There is indeed no Part of the internal Structure of Fish, in which so much Variety was necessary, as in the Stomach, nor any in which more Variety has been exerted by the Creator.

CHAP. II.

*Incontestible Proofs of a strange and surprising Fact,
namely, that Fish will live in Water.*

THE Royal Society has ever been fond of producing Proofs of Things that no body ever doubted ; as to such as the World has wanted Certainty in, they have very prudently chose to be silent. They are a prudent Body, and as they do not love Disputes, in which it is possible they may be proved to be in the Wrong, they chuse to advance nothing, till they are very sure all the World will agree with them in it. Of this Nature is the Problem before us : The often commemorated, but never to be enough commemorated, Mr. Arderon of Norwich, in the Year 1744, took it upon him to prove, that *Fish will live in Water*. He communicated his Plan to Mr. Baker, whose Approbation encouraged him to go on in his Enquiries, till he was able in the four hundred and seventy-eighth Number of the Philosophical Transactions, to assert the Fact boldly, to prove it upon Experiment, and to demand the Thanks of the Society for it.

We find by the Date of his first Experiment, and by that of the Paper which contains the whole, that this amazing Discovery was begun and compleated in the Space of seventeen Months. Conscious of the strict Adherence of the Body to their Motto *nullius in Verba*, he did not presume to expect their believing so strange a Fact, on his barely declaring it: He assures them that he tryed the Experiment first on a Dace, and afterwards on a Ruffe, and on both with Success. He informs them, that he kept these severally, and at Distances of Time, in Glass Jars; and not to depart from the Example of his Friend and Patron, who carefully delivers the Depth and Diameter of the Pill Box he kept a Beetle in, while he forgets to give us any Account of its Nature and Structure; he tells us, that the Jar in which he kept his Dace, held near a Quart, and that that in which he kept the Ruff, was of near three Times that Capacity: Whether they were deep or shallow, whether they were of green Glass or of white, or whether they had Feet or stood upon their Base, we are left entirely in the Dark.

He assures us, however, that he kept his Dace alive in Water, from *September* till *May*; and that he verily believes he might have kept it much longer, had it not been, that over hurried one Day with Business, he forgot to change its Water. He assures us, however, that he had taken so much Care of this beautiful, gentle, silver-coloured Animal, (such are his Epithets) that in the whole Time he kept it, it never lost a single Scale. He acknowledges also, that it was somewhat shy at first, but he tells us, that gentle Usage, and a little Art, soon made it tame. It is somewhat unlucky, that he has not condescended to tell us what this Art was, any more than what sort of Care it was that he preserved its Scales by. We are afraid this Gentleman, who used to be more open and communicative at first, is now learning of Mr. *Baker* to be a little more choice of his Secrets.

In fine, the whole Relation consists in this; that the Creature lived eight Months in Water, and then died by his Neglect.

As to the Ruff, which was the Object of his second Trial; he tells us, indeed, that it was *mighty reserved* at first, and would neither eat nor suffer him to come near it, but that at length it became more tame than the other. This Fish, Mr. *Arderon* assures the Society, he kept seven or eight Months, in all which Time, whatever happened to it before or after, he can aver, that it really and truly lived in Water.

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The Reader will think we banter him, in giving such an Account as this, of a Paper in the Philosophical Transactions; but in very Sincerity, there is no more in it nor; does there appear any the least Hint, that the Author ever thought of proving any thing else by it, than the very Fact we mention in the Title, namely, that Dace and Ruffs will live in Water; from whence he seems to infer, that all other Fish also will.

He concludes with a very strong and pathetick Address to the *English* Virtuosi, to repeat this Experiment, and to find by their own Experience, how certain a Fact it is that he advances; and he takes it for granted, that if this can ever be brought into Practice, it will lessen their Esteem for those Fish brought from *China*, which Esteem he suspects chiefly to arise from their coming four or five thousand Miles.

It may not be improper to answer in behalf of the *English* Virtuosi, of the Number of whom we take Pride in declaring we have the Honour to be, that we do not keep these Fish of *China* in Water, in our Houses, either by way of Proof that they will live in that Element, or because they come so many Miles, but because they are, (as he says of that little Writer *Woodward's* Hypothesis) very pretty.

The *Royal Society* were extremely satisfied with these curious and entertaining Accounts, and returned their formal Thanks for them; but the People out of Doors grumbled something about Nonsense and Impertinence, when they read them, and foreswore buying any more of their Works.

It was about this Time, that the false and malicious Report was set on foot, that the Philosophical Transactions were written by an Exciseman of *Norwich*: How truly this Denotation of Employ may belong to the celebrated Mr. *Arderon*, his Friend Mr. *Baker* is best able to tell; but the Malice and Falsity of the Assertion is evident, from looking over the Contents of this very Number of those Works, in which there are five Papers communicated by Mr. *Baker*, and only two of them are written by Mr. *Arderon*.

PART VI. BOOK IV.

OF ICHTHYOLOGICAL DISSERTATIONS, regarding peculiar *Genera* or *Species* of FISHES, preserved in the TRANSACTIONS of the ROYAL SOCIETY.

CHAP. I.

A Dissertation on Stittlebacks.

TRUE Philosophy despises nothing for being common, but can discover Wonders in the most trivial Objects in the World: We are not, however, for extending the Force of this Assertion to the Societarian Treatise on Stittlebacks; we produce it as an Instance, that it is possible to write as idly about little Things as about great ones. The Accounts of Whales, delivered at Times by the Authors of the Philosophical Transactions, have gone a great way towards establishing a true Character of that great Body among the Ichthyologists of *Europe*, and to the Honour of the Author of this Paper, it is to be observed, that considering the Smallness of his Subject, he has made no small Advances toward claiming an equal Share of Fame. The History, Description, and other trifling Particulars, that a dreaming Naturalist might have plagued a Society of such Philosophers with, he has indeed very carefully omitted; but if *Aldrovand* were alive again, and wanted to make up a Chapter of the *Miracula Pungitii*, here is infinite Store of Matter to have assisted him in it.

We are sensible, that People who are fond of the Study of natural Subjects, expect that the first Thing they are informed of, should be the Names of them, according to some good Author: We do not meet
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with this, however, either at the Head, or in any other Part of this curious and useful Differtation. The Author has given us, indeed, the *English* Names of the Fish in Abundance: We usually call it the Stittleback, a Name of very little Meaning, and which we suppose he has therefore omitted; but he has given us in the Place of it, those of the *Banfsticle*, alias *Pricklebag*, alias *Prickleback*; we wonder he did not add, alias *Stickleback*, alias *Sbarpling*, alias *Skitspigg*, and a hundred and fifty Alias's more, which he might have picked up in the Compass of a few Counties. As to any better Names, we are to remember, that the Author of the Paper is Mr. *Arderon* of *Norwich*, a Gentleman, whom we believe no body ever suspected of understanding any Language but his own, or of having read the Works of any body that did. We are sorry to give such an Account of a Man, whose Name appears somewhat oftner in the present Transactions, than that of any two or three other People put together; but this is a Work in which Truth will out, be what will the Consequence.

The Paper we are about to animadvert upon, is one of the late Productions of that Author. It comes subsequently to his grand Discovery, that Fish will live in Water; a Fact of which he has given so many unquestionable Proofs to the *Royal Society*. It is published in their four hundred and eighty-fourth Number. The Author communicates to the World in it *what he thinks worth Notice*, in Relation to the Subject. Among the amazing Discoveries that he has made concerning it, he tells us, that when kept in a Jar of Water, it is more afraid of a Man, when first put there, than after it has been used to be fed from his Hand: This is unquestionably a most wonderful Instance of Sagacity, but unluckily it comes to us here at Second-hand; the same Author having observed the same of Roach, and Dace, and Ruffs before, and indeed of the other Fish, which for the Entertainment of his Friends, and the Improvement of true Philosophy, he had kept in Jars.

Not to omit any thing material on his Subject, he tells us, that he caught the Banfsticle he kept for Observation in the Month of *April*. This to be sure is *worth Notice*; he says it deposited some Time after its Spawn in some Sand, which he assures us he always puts, (tho' he does not seem to know why) into the Jars, in which he keeps his Fish for Observation.

He was in Hopes, he tells us, of a young Brood from this Spawn; but that he was disappointed; and he tells us, that he imputed the Spawn's

not producing young Fish to the often shaking of the Water : but till we are better informed, as to the Matter of the Generation of Fishes, it is possible other People may impute it to a very different Cause. He tells us, that for some Days after he caught this Fish, it would eat nothing; but he destroys this Miracle immediately, by telling us, that this was common also to all the Fish he had kept. These are a sort of *Particulars*, in Regard to this Fish, which make up the great Part of this curious Paper. After these general Observations, he proceeds to the moral Character of the Fish; he tells us, that it is *bold, quarrelsome, audacious, industrious, sagacious, unsociable, ravenous to a monstrous Degree, and fond of Mischief*. From this, he proceeds to its *Locus Natalis*, not that he uses any such hard Word: He tells us, that it is found in great Numbers in almost all *fresh Waters*, where any other Fish will live; in this, however, there seems to be a double Error; the Author appears to be ignorant that there are such Creatures as Sticklebacks in the Sea, and we are afraid that if he had not mistaken Minnows, and young Fish of fifty Kinds for them, he would not have supposed them quite so universal in our fresh Waters.

From this the Author proceeds to inform us of some remarkable Things of their OEconomy and Diet; he tells us, that he has seen them when a Board or a great Stone have been in their Way, leap up *twelve Inches perpendicular* out of the Water to get over it; how do the little Conjurers know that there is any Water on the other Side of these Boards or Stones? if there should not, however, be any, we suppose Mr. *Arderon* will tell us, they have nothing to do but to leap back again.

From this, he proceeds to lay before us, the Mischief they are continually doing, which he sets at no less, than the robbing the Masters of Fish-Ponds of a very considerable Part of their Profit, by eating up a great Quantity of the Spawn and of the young Fish produced from it. This wise Author seems not to know that Nature has provided for all this Devastation, in the abundant Offspring of many Animals, and in none so much as in the Fish Kind, or that in all breeding Ponds, in spite of these Destroyers, there seldom fail as many of the young Fry to grow up, as are able to live by one another.

The voracious Quality of this Fish, is indeed, according to our Author's Account, pretty remarkable: He assures us, that the single Fish which he

he kept in the Jar, eat up, in his Sight, no less than seventy-four young Dace in five Hours.

The only Particle of the natural History of the Subject that this Author gives us, is the telling us, that it has several offensive Weapons or Spines placed upon its Back and Sides : But he unluckily, like a true Societarian Naturalist, forgets to tell us, how many there are of them.

We are apt to believe that Authors have two Motives in general for writing, Ostentation, and the Instruction of the People who read their Works ; but there is a Secret of some Consequence, which Mr. *Arderon* should be informed of ; that is, that unless the latter of these Considerations be provided for, the former will be apt to miss of its Aim. What Instruction, we would ask, can the World receive from this tedious, trifling, and erroneous Paper ? what Information, even in the History of the little Creature that is the Subject of it ?

We have two different Species of this prickly Fish in our Brooks and other Waters, which is a Fact this Author seems to be perfectly ignorant of, and has so managed it in his Description, that we must be ignorant too, which of the two it is that has been the Subject of his curious and important Observations.

As we have observed in the Beginning of this Chapter, that no Subject is too common for the Examination of true Philosophy, we shall venture, trivial as this Subject may seem, to spend a few Lines in making up the Author's Deficiency on it ; that if any body may have had the Curiosity to wish to be informed of the Nature and Characters of the Fish, that all this Writing has been about, they may not be totally disappointed.

The ichthyological Writers have all given its History more or less perfectly, and consequently, if this Writer had had the least Acquaintance with any one of them, he must have been a little better informed of its History, than he appears to be by his Paper. *Ray* calls it *Pisciculus Aculeatus* : *Gesner* describes it under the same Name ; and others have called it *Pungitius* and *Pungitiens*, *Spinacella* and *Spinachia*. These are all Names invented to express its having Instruments to prick and wound with ; but this is common to it, and to many other Fish of different Genera. The later Writers have called it *Gasterosteus*, the Fish with a boney Belly. This expresses a Singularity, that distinguishes it from all other Fish, and is common to the whole Genus, of which there are three Species.

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The generical Characters are, that its Belly is almost entirely covered with boney *Lamina* of an oblong Figure, that its Belly Fins have only two Rays or Nerves to each, and that one of these is much larger than the other, and is prickly; to which is to be added, that the Membrane covering the Gills, has three Bones in it, which are of an oblong Figure and slender.

According to his Character of the Stittleback, there are three Species of it; two of them of the fresh Water, and one of the Sea.

Of the fresh Water Kinds, the one is larger, the other smaller. The larger has only three Prickles on its Back, and the smaller has ten. The Sea Stittleback is much larger than either, it grows to five or six Inches long, and has fifteen Spines or Prickles on its Back.

The common larger Stittleback, which is what we are apt to fancy our Author means by his Description, has a very large Mouth, with Rows of fine Teeth in both Jaws, but none on the Tongue or Palate: Its lower Jaw is somewhat longer than the upper, and its whole Head is large in Proportion to the Body. Its Nostrils are very small, its Eyes large, and the Coverings of its Gills broad and firm. Its *Linea lateralis* or Line running down the Sides, is nearer the Back than in the generality of Fishes, and runs parallel with it till near the Tail, where it rises into a Sort of Prominence, in some Degree resembling a Fin; so that the hinder Part of the Body, so far, appears somewhat quadrangular.

Its Breast is armed with two oblong and very hard Bones which cover it, joining together at the anterior Part, but not at the posterior: Just above this bony Armature of the Breast, there is a very large Muscle, covered with a smooth Skin, which serves to move the pectoral Fins. The Belly is in the same Manner as the Breast, covered with another double and oblong Bone, which extends as far as the Anus; and at the anterior Part of this, there goes off on each Side another oblong flat Bone; these stand at right Angles with the former, and serve for strengthening the Sides; and finally, beside all these, the whole Length, from the pectoral Fins to the Tail, is armed with a Covering of Bones, oblong and narrow, placed transversely to the Body of the Fish; these are twenty-seven in Number, the largest are in the middle, those toward the Ends are smaller.

To go no farther, here is a Structure in one of the meanest of all the Fish Kind, that shews it is far from below the Regard of a Philosopher.

C H A P.

C H A P. II.

An Account of the Mola or Sunfish.

THE Societarian Writers have always been famous for their Descriptions and Characters of Animals; they have seldom let any thing that appeared strange to them escape without a Dissertation, and their Dissertations have generally left their Readers about as wise, in regard to the Subject, as they were before. The Sunfish is a Creature, the Figures of which have so singular an Appearance, and the Descriptions of which have been in general so inaccurate, that it were much to have been wished, that when it fell in the Way of a Philosopher, it might have been somewhat better explained to the World: The Figures given of it in general, give People an Idea, not of a whole Fish, but of the Head of a large one cut off from its Body; and most that we have from its Description is, that it is as thick as it is long. We owe the Account of it, that is the Subject of our present Observations, to Mr. *Barlow*: It stands in the four hundred and fifty-sixth Number of the Philosophical Transactions.

This very accurate and punctual Author, tells us, that it weighed five hundred Pounds, and that it was taken on the 28th Day of *June*, in the Year 1734. He mentions another, which he had heard of, that was larger, and tell us that the Tail was scolloped, and the Flesh grisly and hard. This is all that regards the Description of the Fish, and short as it is, we could have spared some of it: We should have been full as much instructed in the Nature of the Fish, if he had, instead of the Day of the Month when it was caught, told us how many Teeth it had, or endeavoured by a Dissection to have found out whether we are to believe *Salvian*, when he tells us that it is viviparous.

Tho' this is all the History Mr. *Barlow* gives us of the Mola, it is not, however, all that he says about it: He tells, that its Flesh, on Boiling, turned to a Jelly, which he found answered all the Purposes of Paste. A Societarian Author makes but a very bad Figure, if he is not able to quote the Ancients: The glutinous Substance, to which the Flesh of this Creature boiled, gave Mr. *Barlow* a happy Opportunity of shewing the Society that he had read them, and the World that he

he knew nothing of what they have said. He assures the Society, that the Description which *Dioscorides* and *Pliny* give of the Ichthyocolla or Glue Fish, prove, that it was not the Sun-Fish : An amazing Discovery ! the Society is fond of such. The easiest of all Discoveries are those of Things, that every body knows before ; and the safest of all Subjects to speak positively of, are those which all the World are agreed about.

After mentioning what he does know, in regard to the Meaning of the Ancients, as to this Subject, the Author launches out into what he professedly does not know, that is, whether our Ichthyocolla or Isinglass-Fish, is the same with that of their Times ; of this he professes he is ignorant ; it is an Ignorance, however, we are to inform him, that a Naturalist ought to be somewhat ashamed of ; and that any Man ought to have got rid of, before he presumed to write on the Subject to a *Royal Society*. An Ignorance of this Kind is not to be set right, perhaps, by reading one Author alone ; but by examining and comparing them all, it frequently may. In this Case in particular, we have the Pleasure to assure Mr. *Barlow*, that it might ; and would wish, that for the future, both himself and the other Authors of the Philosophical Transactions, would find it necessary to read before they write ; to understand Things before they describe them.

The Mola or Sunfish has been, as well as the Gluefish or Ichthyocolla, described by the Ancients ; so that if Mr. *Barlow* had known as much of those Authors, as a Man ought to do, who presumes to quote them, he would have been able to inform himself, that there was yet more Proof than he saw of that great Discovery he has to boast of, namely, that the Ichthyocolla of those Times, is not the Sunfish of our Days. These unlucky People, however, tho' they knew it and described it with sufficient Accuracy, they have neither called it the Sunfish nor the Millstonefish, nor the Mola, and how should such an Author as Mr. *Barlow*, have any Idea that they meant this Creature by the strange heathenish Name of *Orthogoriscus* ? *Rondeletius* and *Gesner* borrow this Name from *Pliny*, and add to it, *five Luna Piscis*, the Moonfish ; *Salvian* is the Author, who gave it the Name of Mola ; and from him *Johnson*, *Charleton*, *Willoughby*, and *Ray*, have taken it ; they all describe the Fish under it, but usually with an Addition of *Salvian's* Name, as the Inventor of it ; *Mola Salviani* is the Name they describe it under. The voluminous *Aldrovand*, famous for reading a great deal, and forgetting half of it, has called it *Mola Rondeletii* ; but he blunders in this :
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Rondelet calls it by its antique Name *Orthroriscus*; many have supposed it a Fish, *sui Generis*, and referable to no other Kind. Its Shape indeed is odd enough, but these Authors should have remembered, that there are others as odd in their Figure, witness the triangular and quadrangular Fishes, the *Orbis* and the *Hystrix Marinus*, or Porcupine Fish; and upon examining them more strictly, they would have found these odd Fish all agree, not only in their differing from all other Fishes in Shape, but in all their other Characters; they are hence arranged together by *Linnaeus* and *Artedi*, and make a considerably large Genus, under the Name of *Ostraceon*; they have distinguished this by the long Name of *Ostraceon Catbeto-plateus subrotundus inermis, asper, pinnis pectoralibus horizontalibus foraminibus quatuor in Capite*, a Name that carries a sufficiently distinct Idea of the Fish with it, but of which somewhat might have been spared.

The Characters in which all the Fish of this Genus agree are the odd Shape of the Body, the Hardness of the Skin, the Smallness of the Mouth, and the Want of Belly Fins. The peculiar Species, which is the Subject of this Dissertation, is the largest by much of the whole Genus. The Author of this curious Memoir tells us, that which he describes was of fifty Pounds Weight, many Authors allow it a hundred, and, if we may believe Accounts from *America*, it grows to three hundred Weight. Its Body is flatted and very broad: its Skin is very hard and rough, and is without Scales; its Back is blackish or of a deep Olive, approaching to Black; its Belly of a fine silvery White; its Back and its Belly both terminate in a Kind of Ridges; its Head is flatted, and not prominent; its Mouth very small, its Lips moveable, and its Teeth only two in Number, one large, and one small in each Jaw. There are four remarkable and large *Foramina* in the Head, the Eyes very small, the pectoral Fins are small and of a roundish Figure, they are placed horizontally, and each has twelve Ribs or Nerves in it. The Apertures of the *Branchiae* are of an elliptick Figure, and stand on each Side at the Root of the pectoral Fins; there is a single Fin at the Back, and another opposite to it at the Anus. The Tail is of a semicircular Figure, and surrounds the whole hinder Extremity of the Body.

When dissected, the Liver is found undivided, the Gall Bladder remarkably large, the Kidneys large, and the Ureters and Urinary Bladder in Proportion; the Intestines thick and full of Contortions. We could have wished Mr. *Barlow* had saved us the Trouble of this Description,

cription; but our Work, as a Supplement, would be imperfect, if we omitted an Account of a Subject where the Author has not condescended to give any.

As to the Ichthyocolla of the Ancients, Mr. *Barlow* tells the *Royal Society*, that he is ignorant whether that was the same with our Ichthyocolla or Isinglass Fish or no. We should be sorry to leave the Reader in an Opinion of our Ignorance too, and shall therefore observe, that it certainly was. All the Accounts that they give of their Ichthyocolla, tend to prove it, and when considered together, they leave not the least Room to doubt of it. We are not, however, without some Confusion and Error about it, both in their Times and in much later. *Pliny* describes it twice under two different Names, in the ninth Book and fifteenth Chapter, under the Name of Mario; and in his thirty-second Book and seventh Chapter, under that of Ichthyocolla.

The later Writers have also described three Fishes of this Kind; the *Huso Germanorum*, the *Exos Piscis*, and the *Antacæus*; all which, when their Accounts are strictly examined, and the Varieties of the same Fish under different Circumstances of Age, &c. are considered, prove to mean only the same Species; so that the Authors copying in great Part from one another, have evidently been describing the same Fish under three Names. Whoever will take the Pains of comparing *Gesner's* Description of the *Huso Exos* and *Antacæus Borysthenis*, and of comparing with them *Rondelet's* *Exos* and *Antacæus*, and *Aldrovand's* *Huso* and *Ichthyocolla*, will make this out very clearly, as well as that the *Antacæus avraxios* of *Eliau* and *Strabo* are the same Fish. This Fish is of the Anipenser or Sturgeon Kind, and is distinguished from the common Sturgeon by its wanting those Tubercles which that has. The more accurate Authors have called it hence *Accipenser Tuberculis carens*. Whoever is acquainted with the Figure of the Sturgeon will be sensible of the amazing Discovery of Mr. *Barlow* in his Paper, who has found out that it is not the same Fish with the *Mola*.

C H A P. III.

Of Whales.

THE Whale has the Honour of having afforded more Employment for the societarian Pens than any other of the Inhabitants of the Deep ; but it is not the Fortune of every Subject that is much written upon by these Authors to be most elucidated. We meet with no less than five Papers on this Subject in the Transactions of this memorable Body, which, taken together, give us however less information than might have been conveyed (if any of the Writers had been qualified to give it) in the fifth Part of one of them. They are indeed, according to the Custom of the Works of the Authors of this dignified Rank, abstruse tho' unscientifick, redundant tho' imperfect.

The first of them has the Honour to be of the Number of those Papers which introduce the Philosophical Transactions to the World : It stands in the very first Number ; its Author, who seems to have had Modesty enough to be sensible that he was writing what he ought to be ashamed of, has given us his Profession instead of his Name, and to the irreparable Misfortune of the Writers of Elogies on Naturalists, is lost to all Remembrance.

The Second is by a Man, who wanting the Modesty of the former Writer, tho' not his Ignorance, acknowledges his Name to be *Norwood*. We shall say no more of the Character of this Author, than that this Paper is the only Testimony we have that he ever existed, and that it had been no great Loss to the World, or Injury to Mr. *Norwood's* Character, if we had not had this.

The Third is by the honourable *Paul Dudley* of credulous Memory, a Gentleman damned to Fame by many a well-intended but ill-executed Paper, one of the first Encouragers and Supporters of this now immortal Society, and who seems to have had a very great Share in the establishing, by Example, the Principle, since so happily introduced into the Body, that it is not necessary for a Member of a *Royal Society* to understand the Subject he writes about.

The Fourth is by Dr. *Steigertabl*, an Author we have already had Occasion to mention on the Subject of another Paper. And the last by Dr. *Hampe*, a Gentleman deservedly eminent for his Knowledge in Minerals, and who, if he could have persuaded himself to dispense with the established Custom of the Society, and employ his Pen on Subjects he understood, would not have given us Occasion to pass an unwilling Censure on a Man whom we have much Reason to esteem.

The first of these Papers is on the Whale-Fishing about *Bermudas*. The Author sets out with celebrating the *Bermudas* Whales for their extraordinary *Fierceness* and *Swiftness*; after this he tells us, that the Head of the Fish is *pretty bluff*; that it resembles the Species called *Jubartes*, and that when struck it makes a *hideous Roaring*, at which *all the Whales within Hearing flock to the Place, yet without striking or doing any Harm*.

Such is the Subject of the first societarian Paper on Whales, one of the first published under the very appropriate Name of *Philosophical Transactions*, and which the Authors of the rest have established as a Sort of Model for their succeeding Productions.

As to the *Fierceness* and *Swiftness* of these Animals, they are Qualities that might about as properly have been attributed to a Camel or an Elephant. How just the Idea intended to be conveyed by the Term *pretty bluff* may be, I cannot take upon me to judge; I must with all due Humility acknowledge my Ignorance of the *English* Language so far as to confess I do not know what it means as a Term of Description of Shape. I do not know whether it is taking quite so much Shame upon myself to confess the same Ignorance in regard to the Word *Jubartes*, since there seems a high Probability that it is of no Language at all. It is somewhat unlucky however, that an Author should chuse to save himself the Trouble of a Description of Particulars by refering his Subject to another that no-body knows any thing of.

As to the last important Assertion, we cannot but allow it to be extremely pretty and philosophical, and should be very glad for the sake of the Whale-Fishers that it were true. How certain, how easy, and how vastly profitable would that Business become, if it were possible to find any Way of bringing this about in Fact; if no more were necessary than to strike one Whale to supply the whole Fleet; if the Instant one felt the Iron, all the rest would rise, as this Author tells us, to the Surface, and offer their Bodies to the Stroke with the utmost Calmness and Tran-

Tranquillity, without doing or attempting any Injury to the People engaged in the Fishery.

Mr. *Norwood*, the Author of the second Paper on this Subject, which is published in the thirteenth Number of the Transactions, writes on the same Subject with the former, the Whale-Fishery of *Bermudas*. He says much of the Goodness of the Boats, the Rowers, and the Harping-Irons employed in this Service; the last of these he tells us are fastened to a *leathe* Rope; the Meaning of which Epithet we have unfortunately sought in vain in many Dictionaries. Perhaps it would be a laudable Undertaking to give the World a Dictionary of the hard Words in the Philosophical Transactions, as People have done in regard to the *Greek Testament*. The Difficulty would be in finding a Linguist qualified for the Task. What may be expected from Mr. *Johnson* we are not yet in a Condition to guess; certainly the very qualified Mr. *Badam*, who has wrote a Table professedly on this Subject at the End of the first Volume of his judicious Abridgment*, has omitted all these tho' they are in that very Volume.

All that the Author of this Paper has given us, as to the Description or History of the Fish which is the Subject of it, is comprized in one Line. He says, the Whale of *Bermudas* is smaller than the Whale of *Greenland*, unluckily forgetting that his anonymous Predecessor before celebrated has told us that one of those killed in the Expedition he communicates, was near ninety Feet long, and its Tail three and twenty Feet in Diameter. It is pretty clear that a Whale of this Size is not much smaller than those caught at *Greenland*; but who shall determine when such Authors differ?

Tho' the two Papers we have already done due Honour to, do not raise in the intelligent Reader an Expectation of much more than is contained in them, the Third carries a much bolder and more promising Title; its Author calls it no less than an *Essay on the natural History of Whales*. He adds, that it contains a *particular Account of the Ambergris found in the Sperma Ceti Whale*; but as we do not join with this Author in supposing that Drug of Animal Origin, we shall postpone the Consideration of that Part of his Paper to its proper Place, under the Article Ambergris.

* We would not be understood in this Place as censuring this Abridger of unabridgable Works: We think his Attempt has one great Advantage over all the others, it is the shortest.

It is no rare Thing to find the Authors of these celebrated Works contradicting one another; they are not of the Number of those People who think it necessary to read before they write. This Gentleman quite forgets the Determination of Mr. *Norwood*, who declared a ninety Foot Whale to be a small Fish, and sets out with telling us, that his first Whale is a very large Fish, for it was sixty or seventy Feet in Length, and we cannot but be of his Opinion in this Respect, tho' we dissent from Mr. *Norwood's* in it. This Gentleman baulks a little the Expectation raised by his Title, in the first Sentence of his Paper: He tells us, that what he has to say in it relates only to the Whales found on the Coast of *New England*: of these however he distinguishes, and according to the Fashion of these Writings describes five Kinds. The Reader will not expect after this Character of his Descriptions to find either the scientifick Name at the Head of them, or the Characteristicks of the Species in them. The five Species he mentions are, first, the right Whale, second, the scrag Whale, third, the Fin-back Whale, fourth, the Hump-backed Whale, and fifth, the Sperma Ceti Whale. What sounds most like Description in this Author's Account, is, that he says the Bodies of the finbacked and humpbacked Whale are *shaped in Reeves* lengthwise from Head to Tail; but till we have such an explanatory Dictionary of the societarian Words, as we have already had Occasion to wish for two or three Times in the Course of this Chapter, it will not be easy for any body to profit of the Description Mr. *Dudley* gives us. The great and universal Character of Whales in general, or the genuine Distinctions of each Species, this Author has as carefully omitted, as if to do right were of all Things the one to be most dreaded. He tells us, that the Whales in general are gregarious, and usually go a hundred or more in a *Skull*, another societarian Term, as to which however we have this Advantage over the rest, that it is possible to guess by the Context what it means; how ought this to make the Whale-Fishers pray for the Truth of our first Author's Assertion, as to their attending their wounded Companion, as one such *Skull* would furnish them out pretty sufficiently! One further Assertion we cannot omit doing this Author the Honour of mentioning, however, which is, that the right Whale feeds on *Bole Armonick*, or an Earth at least which the People call so. The Food of every Animal ought to be always made a Part of its History, but we are apt to believe that this is a Food no body ever found out for any Fish in the World before. Mr.

Dudley

Dudley had not the Testimony of his own Senses for this indeed, any more than for what he mentions soon after, of the same Creature's skimming the Surface of the Water to take in a reddish Spawn or Brett which lies on it for Miles together: What this Brett is, whether an animal or a vegetable Substance is not easily to be determined by the Account we have here of it, probably at least it is not the same with the Bole Armonick before mentioned, tho' that being professedly not Bole Armonick neither, it is not to be rashly ascertained if they are two different Substances. Which Part are we to take when Authors who differ are both in the Wrong? this is a difficult Task; it is a Task however, we shall very frequently be led unto in the Course of this Work, and in general the Determination that comes nearest right will be, that Truth must be sought somewhere else. After the History of these Fish, this Author, in the Manner of the indefatigable *Aldrovandus*, comes to the Miracles concerning it. The first of these is, that it ejects the Excrements out at the Anus if wounded, but we cannot forbear wishing, for the sake of the Miracle, that it had ejected them from some other Part: Others have talked of a Whale's oversetting, or even shattering a slight Boat to Pieces with a Stroke of its Tail; but this Author tells us of Boats being cut down from Top to Bottom by a Stroke of a Whale's Tail, and that as evenly and smoothly as if it had been done with a Saw, and that there was not the least Splinter, tho' the Gunnels were of *tough* Wood; by this Account we are informed by the bye that tough Wood is the readiest to Splinter, a Doctrine not much established by Workmen: but what are a parcel of dirty Carpenters to the Members of a *Royal Society*? He gives us several other Instances of the cutting thro' of thick Beams and of slighter Oars all in the same clean Way; not as if done by an Ax, but by a Razor; but we would wish the gentle Reader to see the Tail of a Whale before he pays the full Credit to all this.

Another Miracle of this Animal, is, one of them of her own Accord getting the Fluke of an Anchor into the Vagina, and running off with a Vessel of forty Tun, that had been fastened by it, as swift as if it had been under full Sail; the Vessel we are told was saved from being pulled under by the Cable's breaking, when the Fish came into deep Water, and the Whale was afterwards cast up dead on shore with the Anchor in her Belly.

This is a very pretty Story, but, like many other pretty ones, it has been told so often and so many Ways, that we do not know which to be-

believe as Truth; it is true, that this noble Author mentions Time and Place for it, but it is evident also that *Aristotle* has it, and scarce one of the Wonder-Writers between his Age and Mr. *Dudley*'s have missed it; twenty People have also told it twenty Ways, and of twenty different Species of Fish; one Author, a Gentleman now living, declares he was present when it happened, and that it was a Sea-Man or Merman who did it; and the late Mr. *Catesby* always repeated it as a Thing of his Knowledge, and declared the Creature that did it, not to have been either a Whale or a Merman, but that strange Species of Fish the *Sea Devil*. Among such a Number of Histories a Man would think one at least might be true, but if it were necessary to determine which, one would be for giving it to the earliest Authors. *Aristotle* acknowledges that he only had his from Report; so that perhaps the Truth may be two thousand Years backwarder than his Time, and perhaps in its Origin might have no more Foundation than that of a wounded Fish of some Kind and a Canoe.

Another Miracle recorded by this Author of the Whale, is, that which ever Way the Head is turned when the Animal expires, that Way it will continue to lie let the Wind blow which Way it will, and consequently that it must be happy for the Fisherman when a Whale dies with its Head pointing to the Shore. This is an Account that needs no Animadversions.

Mr. *Dudley* concludes his History of the Whale with that of another Fish, called the Whale-killer; he quotes one *Frangius*'s History of Animals, for the terrible roaring the Whale makes when pursued by this Creature; and tells us of his own Knowledge, that where a Number of Boats have been employed in towing a dead Whale ashore, one of these Killers has come up, seized, and ran away with it in an Instant. Without troubling ourselves about the Fate of the Boats, all which we may suppose were fastened to the Whale they were towing, what are we to judge of the Bigness of this Monster of a Fish, that can thus run away with one of eighty or ninety Feet long, that required a Number of Boats to draw it? why, the Author tells us, it is sometimes twenty or thirty Feet long. The Reader won't be displeased at our placing this History among the Wonders of the Whale, or ranking Dr. *Frangius* with Mr. *Dudley* on this Occasion; all that we are told of this terrible killing Fish is, that he has Teeth in both Jaws, so that there are a sufficient Number for us to fix upon.

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As little as was known of Whales in the Time of Mr. *Dudley*, it is very evident that there was still less afterwards ; we meet with nothing on the Subject from the Time of that Author's Paper, till the Number four hundred and forty-seven, where Dr. *Steigertabl* gives us an Account of a Narwhal, or unicorn Fish, which he saw himself ; tho' a Man might possibly have given full as good a one who had not had that Opportunity. If we have found Occasion to wonder at Mr. *Dudley's* thinking it singular in the Sperma Ceti Whale, that it voided its Excrements at the Anus, here we see a Reason for it ; that Gentleman needs only to have had the Spirit of Prophecy, and to have foreseen Dr. *Steigertabl's* Account of the Narwhal's doing it thro' the Hole on the Top of its Head, to have known it miraculous enough in the Sperma Ceti Whale to evacuate them otherwise ; and who would scruple so trifling a Gift as that of Prophecy in a Man in whom their evidently appear so many others.

What we learn from this Account, beside that the Narwhal has *no Opening or Outlet in the Skin* for the Discharge of the Fæces, and therefore is reduced to the Necessity of evacuating them that Way, is, that there was *no lower Jaw* found in it, and no Teeth in the upper, except the one long one called a Horn ; and that its Mouth was extremely small ; from all which the Author very judiciously infers, that it feeds on Carcases ; and he quotes *Valentinus's Musæum Musæorum* for a Testimony that its Name expresses as much, *Nar* signifying a Carcase. The Doctor adds his own particular Sentiment as to its Horn ; which is, that it does not serve it to break the Ice, as he seems to pay the Society the Compliment of thinking they believed, but *to seek its Food with*.

As the professed Business of this Treatise is to animadvert upon Errors in these Works, and to endeavour after the establishing Truth in their Place, we cannot but observe on this Occasion, that the Narwhal has an Aperture for the discharging its Fæces like other Whales, and that Herbs, not Carcasses, are found in its Stomach when opened ; without this Testimony, however, we are apt to imagine that the Smallness and Structure of its Mouth, even *tho' a lower Jaw should have been found*, ought to have weighed more than *Valentine's* Etymology, and determined the Doctor to have judged it a frugivorous rather than a carnivorous Animal. As to the Use of the Horn, as it is called, there is no Doubt but Nature intended it to be of Service in procuring the Food, it being

excellently calculated for rooting or tearing up of Herbs growing at the Bottom of the Sea. What the Doctor means by this Term *seeking*, indeed is not quite so obvious, perhaps he supposes that it has Eyes in it; if so, he could not have used a properer; and we think this appears probable enough in a Man who could give the rest of this Account. All that we have farther to observe in regard to this Paper is, that the Author, after joining in the Opinion of wiser Men, that what is called a Horn in this Animal is really a Tooth, speaks largely in Praise of the Figure he gives of it, which, however, represents it as a Horn; not growing out of the Mouth, but out of the Front of the Head above it.

As to the fifth Paper, which has the ingenious Dr. *Hampe* for its Author; it has a Merit that most bad ones want, it is short. It is something singular, that this Gentleman calls it an *Unknown Fish*, after every Naturalist, and every Copyer of every Naturalist, had figured and described it: One would think the Doctor had never read, nor ever conversed with any body that had ever heard the Name of a Whale, not to have been informed of this singular Species of it. As to the Account he gives of the Fish, we are sorry to find that he describes the *Dens Exertus*, under the Name of a Horn, and tells us that it was situated not in the Mouth but above it. The most favourable Construction we can possibly put upon his Account is, that he drew it up, not from the Fish itself, but from the Figure of it engraved at *Hamburg*, the same that Dr. *Steigertabl* gives in the abovementioned Transaction. This Paper of Dr. *Hampe's* is published in the same Number with Dr. *Steigertabl's*; and since this we meet with nothing more upon the Subject.

If we would trace the Progress of Knowledge in the *Royal Society* from these Accounts, we shall find that it set out with great Ignorance of the Subject, which it has ever since continued in: That as to the Degree of Ignorance, it must be allowed to have been greatest of all at first; that Mr. *Dudley* had something less of it than the two first Writers on Whales, tho' enough in Conscience; but that since his Time the Society has been sinking to its original Period, and that unless we should have another Essay on the natural History of Whales, by the Author of the late Dissertation on Sticklebacks, it is not easy to conceive any thing that could be less scientifick than the Accounts of the Narwhal by Dr. *Steigertabl* and Dr. *Hampe*.

As the exploding of Errors is of little Use to the World, unless Truths are established in their Place, we shall now, after an Account of what there

there is in the Philosophical Transactions, on a Subject which so many of their Members have written on at so many different Periods of Time, attempt to give such an Account as ought to have been there.

WHALE is properly a classcal, not a general Term. The Character of the Class is a very obvious one, *viz.* The Tail is not placed in a vertical Situation as in other Fish, but stands crossways of the Body or horizontally. Every Fish whose Tail is thus situated is truly a Whale. The Manati, or Sea Cow, has indeed its Tail situated in the same Direction, but the Hairiness of its Body easily distinguishes it from all other Fish. Under this Class of the Whale Kind, there are five Genera distinguished as obviously by the Furniture of their Mouths, as the whole Class is by the Situation of the Tail.

These are, 1. Such as have no Teeth in either Jaw, but in the upper one have in the Place of Teeth a Kind of horny Laminæ, which are what we improperly call Whalebone. 2. Such as have Teeth in both Jaws. After these come such as have Teeth only in the lower Jaw, of which there are two Genera, the one which makes our *Third* Genus, having no Fin upon the Back; and the other, which makes our *Fourth*, having a Fin or Spine there; to these we are to add a *fifth* Genus, in which there is only one Tooth, and that placed in the upper Jaw, and emulating the Situation of a Horn; and we have then all the generical Differences comprehended under the Class of Whales.

The first Kind of Whales are known by the Name *Balæna*, and are distinguished not only by the Whalebone in their Mouths, but by their having a double Fistule for the discharging of Water, which is placed either in the Middle of the Head or nearer the Front of it. Of this Kind of Whale there are two Species, the one of these is distinguished by its having no Fin on the Back, and is called by the more scientific Writers *Balæna dorso caudam versus acuminate*; the Vulgar, and among them the societarian Writers above-mentioned, call it the right Whale, and the Whalebone Whale; this is what Authors, who describe Animals by the Places they come from, call also the *Groenland* Whale. Its lower Jaw is much broader than the upper, and in some Measure covers it at the Sides. The double Fistule is placed in the Middle of the Head before the Eyes, which are small, and stand far apart from one another. The Females have two Teats, not on the Breast but low on the Belly, a little above the Pudenda. The Body is roundish, ex-

cept towards the Tail, where it rises into a Ridge ; the Head is somewhat depressed, and the Tail a little forked.

The other Species of *Balæna* is obviously character'd by having a finny Protuberance on the Back toward the Tail. The Vulgar distinguish it by the Name of the Fin-Fish. *Dudley* varies the Name a little, and makes it *Fin Back*. The more scientifick Writers call it *Balæna tubere pinniformi in extremo dorso*. When fully grown it is as long as the *Groenland* Whale, but is scarce a third Part so thick. It is from the first of these Species that the greatest Quantity of Whale Bone and Whale Oil are obtained ; the other yields less Oil, and the Laminæ called Whalebone are vastly inferior in Value as well as in Quantity. The first is the common Whale of *Groenland*, the other is the Species most frequent about *Bermudas*, and is the Fish the first Whale Describers of the Society would have pointed out to us, if they had known how to express themselves.

The second Genus of Whales, or those which have Teeth in both their Jaws, are distinguished by the more accurate Writers under the Name *Delphini*, *Dolphins*. Beside this obvious Character, they have always a Fin upon the Back, and their Fistule placed in the Middle of the Head. There are three Species of these, distinguished by the Name of the Porpessè, the Dolphin, and the Grampus, but these are in general confounded with one another ; and the Names given indifferently to any of them that comes in the Way. They may, however, be easily character'd in such a Manner as to avoid any such Confusion for the future. The Porpessè is distinguished by the Flatness of its Back, and Smallness of the Body toward the Tail ; the Roundness of the Body distinguishes the Dolphin ; and the Grampus is known from both by its separated Teeth. The Porpessè is distinguished among the scientifick Writers by the Name of *Delphinus Corpore Coniformi dorso lato rostro subacuto*. The Antients have described it under the Names of *Phocæna* and *Tursio*, and the *Danes* and *Swedes* call it the *Marsouin*. The Body is thick, the Back somewhat flat, the End near the Tail small, the Fistule is placed a little behind the Eyes, and there are besides this, six smaller Holes in the Front of the Head ; the Teeth are very sharp, there are forty-eight of them in each Jaw. The Tail is not at all forked.

The Dolphin, distinctively so called, is distinguished by the scientifick Writers under the Name of *Delphinus Corpore oblongo subtereti rostro longo*

longo acuto. This is the true Dolphin of the Antients, and is described by *Aristotle*, *Ælian*, *Appian*, and other Greek Writers, under the Name of *Delpbus*, and by *Pliny* and the rest of the Romans under that of *Delphinus*. The Body of this is less thick than that of the former, and the Snout is longer and narrower. Its Mouth is horribly wide, opening almost to the Breast.

The Grampus, or as others call it, the Springer, the Leaper or Loper, and the North Caper, is distinguished by the Name of *Delphinus rostro sursum repando dentibus latis serratis*. Our *Sibbald* has described this under the Name of *Balaena minor utraque maxilla dentata*; the smaller Whale with Teeth in both Jaws. The Ancients in general called this *Orca*. It is the thickest bodied of all the Dolphins, its Breadth being equal to half its Length; the lower Jaw is larger and broader than the upper, and it has fifty terrible Teeth in each.

The third Kind of Whales, or those which have Teeth in their lower Jaw only, and have no Fin upon the Back, are distinguished by the general Term *Catodon*. There are two Species of them; the one called from its Size, the *little Catodon*; the other, from the Drug called *Sperma Ceti*, first furnished from it, the *Sperma Ceti Whale*. The little *Catodon* never grows to more than about four and twenty Feet in Length, its Head is roundish, its Mouth very small; it is distinguished by the Name of *Catodon fistula in rostro*, from its Fistule being placed very forward on its Snout; it has no Fin on the Back.

The *Sperma Ceti Whale* is distinguished by the scientific Writers, under the Name of *Catodon fistula in Cervice*; the *Catodon* with the Fistule in its Neck. *Purchas* calls it a Trumpe; and *Clusius* and some others by the particular Name *Cete*.

It grows to fifty or sixty Feet in Length, and to a very enormous Thickness; its Teeth stands in a double Series, in the lower Jaw, and are forty-two in Number, they are four or five Inches long, and as thick as a Man's Thumb; the Head is remarkably large, and the Fistule is also large, and situated in the very hindmost Part of it, so as to seem in the Neck. The smaller *Catodon* has been made no use of; this furnishes from its Body a very large Quantity of the common Whale Oil, beside the *Sperma Ceti Oil*, which is principally in its Head.

The fourth Kind of Whales, which have Teeth in the lower Jaw only, and a Fin or Spine on the Back, are distinguished by the Name of *Physeter*; they have their Fistule always in the Front of the Head, and

and their Teeth are crooked. There are two Kinds of these ; the first is distinguished by the Name of *Physeter maxilla superiore longiore, Spina longa in dorso*. Its Head is remarkably large, measuring scarce less than half the Length of the Body, and exceeding any Part of the Body in Thickness. The lower Part of the Snout runs out near two Feet beyond the Extremity of the Jaw, the upper Part of it extends itself much more remarkably, running not less than five Feet beyond the Extremity of the upper Jaw. It is a very large Whale, yet its Eyes are not bigger than those of a common Haddock. The Fistule is placed a little above the middle of the Snout, and is divided into two Passages, but covered with a single *Operculum*. Its Teeth are forty-two in Number, all placed in the lower Jaw, and are of a most singular Shape, they are bent like a Reaper's Sickle, and are in Figure, not perfectly rounded, but somewhat flat ; they are thickest in the Middle, and terminate at the Top in a sharp Cone, which bends inwards, and from the Middle downwards they gradually taper, till at their Insertion into the Jaw they are very small. The Spine, serving as a Fin on the Back, is long and slender.

The other Kind is distinguished by the Name of *Physeter Pinna dorfi altissima Apice Dentium plano*. This Species resembles the other in all Respects, except that its Teeth are less hooked, and terminate in a Plane, not in a pointed Cone at the End. Its Back Fin or Spine is placed nearly in the Middle of the Back, and looks like the Mizzen-Mast of a Ship.

It is to be observed, that the Whale called by the Antients *Physalus* and sometimes *Physeter*, is not of this Kind, but seems to have been what we call the Fin-fish, the second Species of *Balæna* above described.

The fifth and last Kind of Whale, that in which there is only one Tooth, and that situated so as to emulate a Horn, is distinguished by the Name *Monodon*. There is but one known Species of this, which is the Narwhal, spoken of by Dr. *Steigertahl* and Dr. *Hampe*, commonly called the Unicorn Fish, and by most Authors, the *Monoceros Piscis*. Its generical Characters, beside the having only this Tooth, are, that it has no Fin on the Back, and that its Fistule is situated in the hindmost Part of the Head so as to seem to be in the Neck ; It grows to about twenty Feet in Length, and to a very great Thickness ; its Head is shaped like that of a Bream, the Eyes very small, and the single Tooth, which from its Direction forward has been taken to be a Horn, and described

scribed as such by most Authors, is, when full grown, eleven or twelve Feet long, white as Ivory, twisted spirally in a very beautiful Manner, and hollow within from the Base almost to the Point. There was a Skeleton of this Fish shewn publicly in *London* about a Year ago, on examining which, I found the Horn, as it is called, to be, as all the more accurate Writers describe it, a Tooth inserted by Gemphosis, in the left Part of the upper Jaw. This Tooth is what is commonly called the Unicorn's Horn, and was long believed to belong to some of the Land Quadrupeds.

C H A P. IV.

Of the Unicorn's Horn.

THE long, white, wreathed, Ivory-like Body, preserved in the Musæums of all the Collectors, and in the more ignorant Times, called by the pompous Name of the Unicorn's Horn, could not but be allowed to belong to a Fish, after Carcasses of the Fish it belonged to had been cast on Shore with the very Thing itself infixed in the Head.

The absurd Story of its having belonged to a Land Quadruped like a Horse, was thus laughed out of Doors; and Authors drew the Figure of the Fish, with the Thing called the Unicorn's Horn, growing out of its Mouth in the proper Situation. Even this however was not enough to put the *Royal Society* of *London* out of their Way, or to prevent their publishing Errors about it: Nay, ocular Demonstration itself, instead of having that Effect, we find has had just the contrary. In the two hundred and eighty-fifth Number of the *Transactions*, we have an Account of some Curiosities preserved in the *Musæum* at *Copenhagen*. Its Author is Dr. *Oliver*, who had been thither on purpose to see them: In this, among Stories of Womens laying Eggs, Children petrifying in the Mothers Womb, and a thousand other like Things, which the good Doctor believed as firmly as the Fellow who shewed the Things, and gave him his Account of them; he met with one of these Unicorns Horns, as they are called, yet growing out of the Mouth of the Fish, a Part of the Skull of which was preserved with it. It must be a sorry Doctor one would think, who could not determine that a long pointed

pointed bony or Ivory-like Body, growing out of the Jaw of an Animal, and fixed in a Gemphosis there, was in reality a Tooth, and not a Horn, tho' vulgarly called so: Dr. *Oliver*, however, not only misses this grand Observation, but tho' he saw the Head with only one such Horn as he would have it to be, and quotes the Authors who describe and figure it so; yet he rather inclines to believe, contrary to the Testimony of all the Naturalists who had written of it, and contrary to his own Eye-sight, that it was not only a Horn, but that the Creature naturally carries two such on its Head, one on each side: He says, he will not pretend absolutely to determine this Point, but that he is rather apt to believe, that this Head having only one Horn in it, was a *Lusus Naturæ*, than the proper State of the Head; and concludes, that if there were really two of them, he should *then* incline to the Opinion that they were Teeth or Tusks, tho' if single, he seems quite clear in the Opinion of their being Horns.

The *Royal Society* has been always eminent for paying a particular Regard to the Assertions of Impossibilities: This Author is truly of this Stamp. We find that the Assertion of one *Koens*, a *Hamburgher*, that he had brought home from *Groenland* a Head of one of these Fishes with two Horns on it, was the great Thing that had, in his Opinion, outweighed Reason, the Attestation of Naturalists in general, and his own Eye-sight.

This Horn, as it is called, is, in Reality, a Tusk of the Fish which produces it, which is the Narwhal, described at large in the foregoing Chapter of the Whale.

PART

PART VI. BOOK V.
OF DISSERTATIONS, on REPTILES
and INSECTS, by Members and Correspon-
dents of the ROYAL SOCIETY.

CHAP. I.
Of the Poison of the Rattle-Snake.

PEOPLE who have not read the Philosophical Transactions can have no Idea of the wonderful Properties of Things, tho' they have heard and read of them on ever so many Occasions before, and that from ever so many Hands, and those ever so eminent ones: We have an Instance in this famous Subject, the Poison of the Rattle-Snake. Authors out of Number have written on it, and have told us of its fatal Effects, when communicated to the Body by a Bite of the Animal; but we have hitherto supposed that Kind of Communication necessary for the Effect: Alas, could we have prevailed with ourselves to read those Works, we should have been informed better: We are told in them, that it can communicate itself thro' the very Pores of Wood, and poison at a Yard's Distance from the Place where it has touched.

We are obliged, for this unparalleled Account, to Dr. *Mather*, a Writer very deservedly famous on some other Occasions. It stands in the three hundred and thirty-ninth Number of the Philosophical Transactions. He tells us, that a certain Person having killed a Rattle-Snake, by *lashing it with a small Switch* (which by the bye is a very good Way of killing such Animals) suffered it, when dying, to bite the End of the Switch; as he was afterwards travelling on, the Doctor

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tells us, a Fly bit his Thumb, and he rubbed the Place with the larger End of this Switch, which was the opposite one to that which had been bit by the Serpent, and that the Consequence of this was, that his whole Hand was poisoned, and swelled up by Means of the Venom of the Serpent, which had made its Way up the whole Length of the Switch.

One would think this might have been a pretty sufficient Testimony of one Man's Judgment, as to the Poison of this Creature; but the Doctor does not leave us so; he seconds it by another, that will long be remembered to his Honour: He tells us, that a Man, having a broad Ax in his Hand, provoked a Rattle-Snake to bite the Edge of it; that the Colour of the Steeled Part, where bitten, immediately changed, and that on the first Stroke he made with the Ax, this discoloured Part dropped out, and left a great Gap in it.

We do not chuse, to question the Veracity of any Author whose Works stand in these Transactions, but we must be allowed now and then to quarrel with their want of Apprehension. We would ask this learned Society, whether a Man's Hand might not swell on being bit by a Fly of some mischievous Kind, even tho' it had not been rubbed with a poisoned Switch? and whether a Nick might not happen in the Edge of an Ax, that a Man was hewing with, without the Assistance of the Bite of a Rattle-Snake?

CHAP. II.

Of the Manner in which Reptiles change or cast their Skins.

IT seems impossible to be of the Name of *Baker*, and not to be a Philosopher: The Author of this curious Dissertation, is a Son of the Gentleman of that Name, so often and so justly celebrated in this Work. It stands in the four hundred and eighty-third Number of the Philosophical Transactions.

This young Gentleman, after taking up somewhat too much Paper in telling us, that the Water-Newt changes or casts its Skin as Serpents do, and communicating some other Observations of equal Consequence, observes, that the Reason of his troubling the *Royal Society* with this Relation is, that tho' it has been long known, that the *Serpent Kind* cast

cast their Skins, yet we are ignorant of the Manner of their doing it, because they do it in their Holes ; but that by knowing how this of the Newt is done, we may form a reasonable Guess at the Way in which the others perform it.

He tells us, that the Newt gets its Skin off by loosening *with its fore Feet* the Skin about the Jaws, and getting first one Leg and then the other of this Pair out, after which the rest is easy : And who will doubt, but that this must convey a very distinct Idea of the Manner in which Serpents do it, which have no Feet at all.

The Youth of this little Philosopher pleads against our saying any more : We are not censuring him for writing, but the President of the *Royal Society* for countenancing such Matters.

CHAP. III.

An Account of a remarkable Generation of Insects.

THIS Account is given by one *Lewis* ; it stands so late as in the four hundred and twenty-ninth Number of the Transactions, and is delivered with all the Air of a miraculous Phænomenon, different from every Thing that had been observed before : It is not much to the Credit of the Society that it was not discovered by them to be a very familiar and common one.

The Author tells us that there is a Tree in *Maryland* called from the Number of Flies hatched from its Leaves, the *Fly-Tree* ; that its Leaves are like those of the Mulberry, and have little Bags on them, out of several of which, when cut open, there would issue a Fly like a Gnat ; he adds, that the Bags appeared small while the Leaves were young, but grew with them till they arrived at their full Bigness, and were inhabited by the Fly he mentions, as well as by several other little Insects. Thus begins, and thus ends the Relation ; the Whole is delivered with an Air of Importance, and we are left to believe, if we please, (as the Society seems to have done) that the Flies grow like the Leaves, and are produced by the Juices of the Tree. The true History of the Whole is this.

A small Fly, of the ichnumon Kind, described by all the Naturalists who have treated of Insects, is produced from a Worm or Maggot, fed by the Juices of the Tree this Gentleman mentions. The Parent

Animal, when about to lay her Eggs, pierces, with an Instrument Nature has furnished her with in the hinder Part of her Body for this Purpose, the outer Membrane of the Leaf, and at the same Time deposits a Drop of acrid Matter, and a single Egg in the Wound. The Juices of the Leaf becoming vitiated by this unnatural Admixture, and several of its small Fibres being broken, there rises a morbid Tumor on the Part which encloses the Egg deposited there, surrounding it on every Side. Juices are brought to the Part in abundance from this Time, the Tumor encreases, and some time after the Animal is produced from the Egg; this is not a Fly like the Parent, but a small white Maggot, whose proper Nourishment is the Juice of that Tree; it feeds on this in perfect Security till the Time of its destined Metamorphosis, when after having lain some Days in the chrysalis State, without Motion, or any Appearance of Life, it bursts out in its Perfection in Form of a Fly, like its Parent. As soon as this happens, Nature instructs it to gnaw its Way thro' the Walls of its Prison, which it does in a very little Time, and makes its escape to impregnate a Female of the same Brood, if a Male; or, if itself a Female, to be impregnated by some of its Brothers of the same Offspring, and then to deposit its own Eggs in the same Leaves, to be brought up to their Maturity in the same Manner.

Thus the whole Mystery of this Generation is the same with the common Course of Nature, in all those Insects which are hatched in Galls: The Protuberance itself is properly a Leaf Gall, and is perfectly analagous to those we continually meet with on our Limes and Willows. Mr. *Lewis* must have had great Luck if he often met with Galls so ready to give forth their perfect Fly, that it flew out on Cutting; for it is but a very short Period that passes between the Fly's being in this State and in Condition to make its Way out of the Bag and its doing it.

The other Insects described, as formed in the Substance of the same Gall or Bag, appear by the Account to be the Pucerons, a Kind of Insect always bred on Trees, and often forming Leaf Galls much more considerable and remarkable than those of this History, for the Reception of their Young. The common Galls used by the Dyers are formed exactly as the Bags of these Flies are, and shew very frequently the Holes out of which the Fly has made its escape.

C H A P. IV.

Of the Transmutation of Water into Maggots.

THIS is of the Number of the Miracles recorded in the Philosophical Transactions: it stands in the twenty-seventh Number; Its Author is Mr. *Stubbs*. This Gentleman assured the Society, on his own positive Experience, that in the Middle of the Island of *Jamaica* he found a Plain called *Maggoty Savannah*, where, when it rained, the Drops, as they settled on the Seams of People's Garments, in half an Hour's Time became living Maggots.

The Society, perfectly convinced of the Truth of the Fact, delivered it to the World under their Countenance and Authority, but unluckily both they and the Author have forgot to tell us, whether it was the Place, or the Seams, that gave Origin to this Metamorphosis of the Water; for it seems, that if it fell in any other Part of the Island, or any other Part of the Garment, the Miracle did not happen.

C H A P. V.

An Account of a Tree-killing Insect.

THE History of this very remarkable Insect stands so early in the Philosophical Transactions as in the Eighth Number, yet so it happens that no body has ever seen or heard of the Creature since: It is described in so truly societarian a Manner, that it is impossible to guess what Sort of Creatures it is; its Effects seem the principal Thing the Society paid their Regard to; these were, the destroying Trees, by only once striking its Tail into them; an Effect which it would have been no Discredit to them to have paid as little Attention to, as to the History of the Animal said to produce it. We who are bold enough occasionally to contradict this wonderful Body, are not afraid to affirm, that there is not, nor ever was, any Insect that had such a Power.

C H A P.

C H A P. VI.

Of Kermes.

THE Account we have of this valuable Product in the Philosophical Transactions, is one of those which the Society seems perfectly satisfied with ; it stands as early as in the twentieth Number, and has never been disputed or contradicted by any of the Members since that Time, nor has any thing been thought necessary to be added to it. The Author, Mr. *Verney*, sets out with telling us what Kermes is ; namely, that it is a vegetable Excrecence growing upon the Wood, and sometimes upon the Leaves of a Shrub common in *Languedoc*, and is full of a scarlet Juice : He tells us, when taken from the Tree, they yield a red Powder, every Grain of which would hatch into a Fly, which would die in a Day or two, if this was not prevented by wetting this Powder with Vinegar ; he finally informs us, that the Powder issues out at a Hole in the Side of the Excrecence at first, and falls ; but that afterwards other Grains adhere to the Outside of the Excrecence, and these he tells us, have been hatched within the Husk, and have gnawed their Way thro' its Cover. It appears then from this, that the Kermes is only a particular Kind of Gall, like those used in Dying, or like the Bags of the Leaves of the *American Fly-Tree* ; and such is the Credit the Philosophical Transactions obtained a long Time in the World, that every body took the Fact upon their Attestation, and declared Kermes an Excrecence of a Tree : Some imagined it the Fruit of the Shrub on which it is found, but others were at great Pains to contradict that, and to shew that it bore other Fruit beside.

Every Thing, however, is not exactly as it appears to be in the Philosophical Transactions, nor is the Account they give of this Drug less imperfect than false. Allowing the Kermes to be the Thing they describe, a Vegetable Excrecence, would it not have been well to inform us of its Size, Shape and Colour ? and when we are told that it is found on a Shrub in *Languedoc*, would it not have been as well to tell us what Shrub that was, provided either the Author or the Society knew ? Is a scarlet Juice a natural Matter for the filling a
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Vegetable Excrecence ? are there any such so filled ? how comes this Juice afterwards converted into a red Powder, every Grain of which would produce a Fly, if not prevented ? and how is it, that this Author explains this Assertion consonantly to his telling us that many of them do hatch within the Husk, and are seen on its Surface, and that not in the Form of a Fly, but as Grains still ?

The Truth is, that Kermes are no more Vegetable Excrecences of the Shrub they adhere to, than Caterpillars are Excrecences of the Trees and Plants whose Leaves they feed on ; they are Insects produced from the Eggs of other Insects of the same Kind, and, in their turn, produce others like themselves.

The Shrub they are found on is a little Ilex, or Holm-oak, described by the Botanical Writers under the Name of *Ilex Coccigera*, *Ilex Cocciglandifera* and *Quercus foliis ovatis dentatospinosis*. It is a low Shrub ; its Branches tough, its Leaves like those of Holly, and its Fruit an Acorn much resembling that of the common Oak. It is common in *France*, *Spain*, and *Italy*, but the greatest Quantity of the Kermes is produced in *France*.

The Kermes is an Insect of the Nature of those which we frequently meet with on our Fruit-Trees, in Form of little Crusts or Scabs, and which our Gardiners have called the Greenhouse Bug. *Reaumur*, the only Author that has entered thoroughly into their History, calls them from their great Resemblance to Galls, and other vegetable Excrecences, *Gall Insects* ; they are of the Number of those, the Male of which has Wings, and the Female not : The Male is never regarded, nor appears to belong to the Family, he flies about at his Pleasure, and is as often seen about other Trees as the Shrub he was produced on : The Female, on the contrary, remains for a great Part of her Life fixed to the Place where she is first seen, and has very little the Appearance of an Animal. The Part of their Life which they spend in this fixed State, is that in which they are most the Objects of our Observation ; that in which they grow most, and produce their Young in all this Time, they appear a very Portion of the Branch they adhere to ; and what is most singular, is, that the larger they grow, the less they look like Animals ; and while they are employed in laying thousands of Eggs, one would take them for nothing but mere Galls. Such are the Gall Insects in general : there are a great variety of them in Shape and Colour. The particular Species, which is the Subject of this Paper, is of

a roundish Form, or more determinately speaking, it is of the Figure of a Sphere, from which a small Segment has been cut in one Part; it is by this Part that it adheres to the Tree, from which it draws its Nourishment. Such is the Figure of the Female: When full grown, she much resembles a Kind of Purse or Bag, formed of a tough and strong Membrane, of a shining blueish Black, like that of a ripe Plumb, and in the same Manner covered with a fine grey Powder: This is the natural Colour of the perfect Kermes; what we see of it is, indeed, usually of a reddish brown Colour, but this is owing to its having been wetted with Vinegar in the Curing: It is in this State that the Creature deposits its Eggs; these are round, of the Bigness of a small Pin's-Head, and of a scarlet Colour, easily crushed, and full of a fine rich Juice, in which the Virtue of the Drug consists. As the Creature begins to lay these, she provides for their Safety. She does not leave them exposed on the Bark of the Tree, but draws them under her own Belly; the Skin of her Belly is pressed upward by them, as they are laid in greater and greater Numbers; and, in fine, when they are all laid, is every way squeezed close to the Back. The Creature has now done her Office and dies, her Body remains however fixed to the Place where it was, and forms a Kind of hollow Shell, under which the Eggs are preserved safe from all Injuries, till the Time of their Hatching. It is in this State that the Kermes are gathered for medical Uses, but if left on the Shrub the Eggs soon after hatch, and produce a Multitude of young ones, some of which are destined to no farther Change but that of their increased Bigness; but others, after they have passed the proper Time of Rest in the Chrysalis State, become Flies, and are the Males which afterwards impregnate their Sister Females of the same Brood. The young Kermes are extremely small, and scarce distinguishable on the Branches without the Help of Glasses; they are very nimble at this Time, and continue so from the Month of *June*, in which they are hatched, till the Month of *March* in the following Spring; they acquire very little Bigness in the Summer and ensuing cold Season, and are not regarded till the Time of their fixing themselves, which is in the Beginning of *March*; when once fixed they soon begin to grow large, they are quickly of the Bigness of a Millet Seed, of a scarlet Colour, with some little Tufts of a white cottony Matter on their Backs, and a downy Bed of the same Kind under their Bellies. At this Time the Males may be always observed hopping and flying about them:

They

They are extremely small, they have only two Wings, and are of a dusky greyish Colour with a cast of red in it, their Antennæ are very slender, and they have two Hairs or Filaments growing from the hinder Part of the Body, and between these are placed their Organs of Generation in form of a very small oblong Body bending downwards; a careful Observer may, at a proper Season, find many Opportunities of seeing these Males impregnate the Females or common Kermes; after this they begin to grow larger, and particularly to swell and become more convex: In the Month of *April* they are found nearly of their full size, but containing only a clear red Liquor like Blood; and in three Weeks or a Month after this, they will have laid their Eggs, and become in a Condition to be gathered for Use.

The Life of the Female is of about a Year, that of the Male is less; for as soon as he has done his Office, and impregnated the Female, he dies. Such is the genuine History of this Creature, so long mistaken for a mere vegetable Excrecence. There have not, indeed, been wanting, some, who have suspected it for an Animal; the Count *Marsigli* was of this Number at one Time, but he afterwards persuaded himself that they were only Galls, by an Experiment of making Ink with them with Copperas, as with the common Galls; an Experiment that ought only to have shewn him, that vegetable Juices, which in their natural State would turn black with Vitriol, do not lose that Property by passing thro' the Vessels of an Animal Body.

C H A P. VII.

Of Cochineal.

THE societarian History of Kermes naturally leads us to that of Cochineal, a Substance usually ranked in the same Class with it, and which has had the Fortune to be as long misunderstood, as to its Nature and Origin, as the Kermes itself; tho' the Transactions furnish us only one Dissertation on the Subject of Kermes, they are abundant on that of Cochineal; there are no less than five Papers there, expressly on the Subject, besides a great Number of occasional Blunders about it in the Memoirs on other Subjects.

The first Account we have in this memorable Collection, stands in the fortieth Number, its Author has been modest enough to conceal his Name; a Virtue that might have become the Author of such a Paper very well, if it had been published any where else: But among congenial Nonsense surely it was absurd and cruel to disown it. He sets out with telling us, that the Cochineal is a *Fly*; he might as well have told us it was a Whale or an Oyster; and out of his Publick-Spiritedness, proposes to the Society to make some other Flies, by Fermentation, which should have the same Virtues; he is good-natured enough to give the Method at large of doing this: But of this we have said more in its proper Place, under the Article of *Making of Insects*.

The second Account of the Cochineal in the Philosophical Transactions is in the one hundred and second Number. This Author, whoever he is, for he also conceals his Name from us, flatly contradicts the other, and the Animal in his Hands, is instantly changed from a Fly to a Beetle; he very significantly, indeed, retains the Term Fly for it, but he tells us in his Description, that it is a Beetle, and indeed the very same with our common Cowlady. This Author comes just as near the Truth as the other, in regard to the Nature of the Animal, but he is infinitely greater in his Account of its Origin; in this Sense, Reason, Nature, all fall down before him, and he is the great Author of a new System, which will, we flatter ourselves, appear as ridiculous to every body, but the *Royal Society*, as *Linneus's* Botany did to that distinguishing Body itself. He tells us, that the Cochineal is at first a small Protuberance from the Plant, which afterwards, by the Heat of the Sun, is converted into a living Insect; which, after a stated Time, becomes the Beetle known by the Name of Cochineal. Let us no longer censure as fabulous the *Egyptian* Accounts of Animals produced by the Sun's Heat from Mud: The *Royal Society* countenances and publishes to the World a Miracle full as great, in which the same Power is the Agent. A Vegetable Wart, a *Blister upon the Leaf*, to use the very societarian Term, becomes a living Animal, furnished with a vast Apparatus of Parts, nay, with Organs of Generation, which, as, according to that Account, the succeeding Broods are to be produced in the same Manner that this was, not by the ordinary Methods of Generation, can be of no use to it.

The Author of this curious Differtation seems to have been aware that the Cochineal was no more like a Beetle than a Woodlouse, and fears People should be asking troublesome Questions about its Wings and other Parts ; but he has provided against all this, by giving an imaginary Process, in the curing the Creatures for Sale ; in which he tells us, the People carefully separate the Wings from the Bodies, after rubbing them off between their Hands.

When the Reader has been informed that this Creature has in reality no Wings, he will be easily convinced that all this Care lay in the Author's Brain only, and that the whole Proceedure was of his own inventing. What a Genius must a Man have to invent such a formal Process, and what must he think of the Body, who, he made no doubt would believe it.

The Society seems, indeed, to have been a long Time perfectly satisfied with this Account. We hear nothing more about Cochineal in their Transactions till in Number two hundred ninety-two, that great Genius Mr. *Lewenboeck* attacks it with his Microscope. It was not that any Doubt of the Society, as to the Truth of the former Account, had led him to this, but a *Dutch* Merchant had dared to think himself wiser than the whole Society, and to question the Fact, of Cochineal being any Insect at all. He argues in a Manner every Way worthy the Body to whom he addresses his Arguments ; first, that they cannot be Animals, because they are too small ; two of the largest of them hardly weighing a *Grain of Gold* : Secondly, that Nature cannot produce such vast Numbers of Animals, as we annually have of them : Thirdly, and lastly, that if she did, Men would not be able to catch them. From the Whole of these conclusive Arguments he infers, as a Certainty, that Cochineal is not an Animal of any Kind, but is either a Seed or an Excrecence of a Plant.

Mr. *Lewenboeck* does not attack his Arguments in form, but draws upon him the Account just recited, and which himself had introduced to the Society ; all this, as too precious a Jumble of Nonsense to be degraded by the common Fate of Writings, that of once Printing, he repeats against him, and afterwards produces his own new microscopical Observations upon the Subject, in which he tells us, he had found Eggs, perfect Eggs, shaped like Hens Eggs, in the Cochineals, and these to the Number of two hundred in each, every one of them having a perfect Animal in it, which he could discover, and see the very Limbs of, on

removing the Integuments. What becomes now of the System in the former Paper? Mr. *Lewenboeck* forgets here that he had adopted it, and gives us one quite contrary: What occasion for Eggs and Embryos, if the Animal is not to be produced by them, but to grow out of the Leaves of a Plant? The System, however, is still a wild and unnatural one; Mr. *Lewenboeck* has supposed at first, that the larger *Cochineals* were Females, and the smaller the Males; but on examining these last, he found Eggs in them too; and hence he forms his new System of them, which is, that they are produced from Animal Parents, but without Copulation. An Assertion like this was in danger of being laughed out of Countenance, but the Author, to proceed in the truly societarian Way, strengthens one Blunder by another, and, lest we should disbelieve this Sort of Generation in the *Cochineal*, he tells us, that it takes Place also in another Race of Insects; to which he gives no Name, but by which, from his Description, lame as it is, we may make out, that he means the *Pucerons*; a small green Insect, common in vast Numbers on the young Branches of Elder, and several other Trees and Plants: He boldly asserts, that these Creatures are all Females, and breed without Copulation: But this is too unnatural to be true. There is something very extraordinary in the Propagation of these Animals, but they have been seen in Copulation.

We can never enough admire the Boldness of this Author, however, in his Assertions of Falshoods to prove Falshoods; he is not content with making the poor little *Pucerons* Mongrels of this Kind, but he roundly tells us, that Eels, Shrimps and Prawns, are in like Manner all Females, and that there are no such thing as Males of any of these Species; this is an Assertion every Way worthy the Man who makes it, and the Place where it stands. We are to acknowledge Merit, great Merit indeed, in *Lewenboeck*; he had the good Fortune to be one of the first People who worked at microscopical Observations, but we are to acknowledge at the same Time, that he has the Honour of having stocked the *Philosophical Transactions* with more Errors than any one Member of it, excepting only his Successor in Peeping, Mr. *Baker*. But to pursue his Discoveries on this important Head, he farther observed, that the Head and Breast of the *Cochineal* Animal were tied to the hinder Part of the Body only by a small Ligament, and he adds, from the Author of the preceding accurate Accounts, that the *Cochineal* is never good till the Animal has Wings. These are two glorious Assertions, in regard to an Animal that has no

Division

Division of the Head from the Body, nor even the least appearance of Wings, or of any Thing analogous to them. Upon the Whole, he concludes, that what we call *Cochineal*, is neither a Seed, as the *Dutchman* supposed, nor a compleat Animal, as others judged, but only the hinder Parts of a self-generating Beetle. He adds several Figures to this Account, expressing what he never could have seen, unless his Eyes were so very excellent, that they could see Things that never existed; among these we may reckon the Vestiges of the Ligaments connecting the two Parts of the Animal, and the separate upper Part. We are quite lost in Amazement, that so fertile a Genius as his could not discover Wings adhering to these, but should leave us to take so important a Falsity upon a bare Assertion. This is, in some Degree, made up to us, however, by his positive Assertion that he did find Wings among the *Cochineal*, and even the hard scaly Cases or Covers of Wings, such as the Beetles all have, tho' he unluckily found these, as he tells us, on the hinder Part of the Animal, a Part he had before observed Wings were not to be expected on, as being found on no Animal in the World in that Part; he goes so far as to describe these Cases of Wings, and tells us they were black with a small red Spot upon each, nay, he tells us the very Use they are of to the Creatures (which by the bye never possessed any such Thing) and, finally, does Providence great Honour for being the Contriver of a Thing that does not exist. In how truly Societarian a Manner he concludes his Paper, with an Observation equal to the rest, which is, that the circular Furrows we see on the Body of the *Cochineal* are not natural, but are only acquired in the Drying.

Could one imagine that his Antagonist could remain unsatisfied after so many Proofs of *Cochineal* being truly an Animal? The whole wanted Weight, however, with him; it is no Wonder that he who had before disputed the Opinion of a whole *Royal Society*, should now question the *ipse dixit* of *Lewenboeck*. He was in doubt, he tried all *Lewenboeck's* Experiments after him, and, like most Repeaters of societarian Experiments, he thought he found Reason to form an exact contrary Opinion from them; he declares Mr. *Lewenboeck's* Eggs to be Seeds, their Shells the Membrane surrounding those Seeds, and the very Blood-Vessels, which that indefatigable Observer had found in them, to be Filaments analogous to what we see in Cherries and Gooseberries.

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We are not to wonder, however, that this mercantile Gentleman ventured to contradict Mr. *Lewenhoeck*; he knew he was one of a Body of Men, who were very much addicted to contradict themselves: Nay, that this very *Lewenhoeck*, on this very Subject, had already three Times contradicted his very self. He had declared for many Years, [that Cochineal was a Seed of a Plant, and was of the Nature of the *Uva Ursi*. When requested by Mr. *Boyle* to re-examine the Subject with his utmost Attention; he obeyed; and the Result was, that he was the more confirmed in his original Opinion; and that tho' he had before only said they were Seeds, he would now have sworn it. Mr. *Boyle*, in Return to this, sent him some unlucky Attestations of Cochineal's being a living Creature, such as he found there could be no Deceit or Mistake in. What his Microscope could not convince him of, this did; he now examined, or said that he had examined the Subject again, and renounced his old Error for a new one: When he had allowed them Animals, he went backwards and forwards as to their Nature, and at one Time affirmed they went thro' the common Change of flying Insects; being first Worms, afterwards Beetles; at another Time he denied it, and a Twelve-month afterwards asserted it again. It would have been too tedious to have transcribed at Length all this Gentleman's Errors alone on this Subject; we see the last Determination of his Judgment in this Paper, and are let into this great Secret by it, that after changing his Opinion fifty Times upon the same Thing, he at length knew as little of it, as he did when he first set out in the Enquiry.

There seems a Fatality attending the *Royal Society*, that a Man, tho' of real Knowledge while disengaged from it, becomes like the rest as soon as he begins to write for the common Stock. The next Paper, in order of Time to this of Mr. *Lewenhoeck*'s, concerning the same Subject, is by a no less considerable Author than Dr. *Tancred Robinson*, an excellent Naturalist in general, and who had written excellently on other Occasions; but here he seems infected by the very Air of the Room, and writes as worthily of the Place his Writing is to appear in, as e'er a *Dudley* or a *Baker* of them all. The good Doctor takes great Pains to bring himself into Scandal on this Account. We are told of an unfortunate Fellow who had but one Story, which was about a *Gun*, and who would mistake the Barking of a Dog, the Cracking of a Fan, or, upon Occasion, nothing at all, for the Report of a Gun, to introduce it.

The

The Doctor never saw the Cochineal in its natural State in his Life, but out of Patience at being in a Reputation so different from that of his Brother Societarians, he observed, that about *Naples* he had seen some wild *Opuntia*; this, says he, is the Plant on which the Cochineal feeds, and this puts me in mind of Cochineal. After all this Pains to bring in somewhat about the Cochineal, what is the Result? Why, he tells us, that the Cochineal Vermiculus feeds on this Plant before the Time of its changing into the Chrysalis or Aurelia of a Ladycow, and that the Colour lies in this Nymph Worm, not in the Beetle. (We suppose, nobody, who knows that the Cochineal never becomes a Beetle at all, will question the Truth of this Assertion) and adding Blunder to Blunder, he sings the Praises of the Colour of the Kermes Worm, before it turns into a Fly (which it does exactly at the same Time as the Cochineal does into a Beetle) and recommends it strongly to us to enquire into the Nature of the Worms of our own Beetles, and try whether some of them will not yield a Colour equal to one or other of these.

Must not the World be amazed at such a Complication of Errors in a Paper written by so truly accomplished a Man? will they not cry out with us, what Miracles are too great to be wrought by a *Royal Society*?

The Society were by this Time as well satisfied as ever they were of any Thing, that Cochineal was the hinder Part of a Beetle: This was no more a Truth, indeed, than most of the other Things that they are satisfied about; but what should be the Method of convincing them? Reasoning, Philosophy, or the Attestation of their own Eyes? no, these have been employed in vain to such Purposes too often already.

Happily for them, and indeed for the *European* World in general, two *Dutchmen* quarrel upon the Subject; they use the common Fools Argument, a Wager, and not Philosophy; but the Oaths of People on the Spot are to determine between them.

The proper Measures are taken, Attestations on Oath are brought, and by these it is not only proved that the Cochineal is an Animal, which was all the Wagerers wanted to be determined in, but in the Course of the Evidence it appears that this Animal is not a Ladycow or a Beetle of any Kind, that it has none of those Wings Dr. *Robinson* mentions; none of those Cases of Wings *Lewenboeck* figures and describes so accurately, nor ever goes thro' that Transformation he has praised the Author of the *Universe* so much for allowing to it. Upon the whole, that it is a very Reptile, producing young ones perfect
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and like itself, but small; and that a peculiar Species of Fly is seen about the same Plant, which tho' not known by the Name of Cochineal, nor at all like the Creature so called, yet seems to impregnate it.

The true History of this famous Insect is this. It approaches in many Things to the Nature of the Kermes, and is one of a Class of Animals so like the Gall Insects, of which that is one, that the same accurate *Reaumur*, who has called them by that Name, has given these that of Progall-Insects. The Progall-Insects pass a great Part of their Lives as the Gall-Insects do; fixed to the same Spot on the Plant they feed on, but they have so much more of the Insect Form about them, that they are not in danger of being mistaken, like them, for Galls or Vegetable Excrescences, but may be always known for what they are; the Rings or circular Wrinkles on their Bodies, are so far from being accidental, or the Effect of Drying, that they may be always seen in them in every State, from the most minute Size in which a Microscope can discover them, to their utmost Growth.

The different Species of the Progall-Insects feed on different Plants and Trees; that peculiar and valuable one, which we call Cochineal, feeds only on the *Opuntia*, described by the Botanical Writers under the Names of *Opuntia Maxima folio oblongo, rotundo, majore, Spiculis obtusis mollibus & innocentibus obsita floribus rubris variegatis*; and *Tuna mitis flore sanguineo*. It is a singular Plant, having no Stalk, but, being composed of flat and succulent Bodies, called Leaves, growing upon and out of one another. Its Fruit has some Resemblance to our Figs, but wants their luscious Taste: Its Juice is a fine Purple, and tinges the Urine of People who eat of it in such a Manner, as to make it resemble pure Blood. It is evident enough that the high Colour of the Cochineal is owing to this Juice, and it would be an idle Scheme to attempt the procuring Animals of the same Use in Dying, from any other Plant or Tree whose Juices had nothing of the Colour. What we use of the Insect as Cochineal is the whole Animal, as in the Kermes, and, as in that, it is only the Female that we use: The Male of this Species, as in the Kermes, and in all the Gall-Insects, and all the Progall-Insects, is a Fly; but this will not at all plead in Favour of the societarian Errors in regard to this Subject: This Fly is not in general understood to be Cochineal, or to have any thing to do with Cochineal; it is not collected with it, or even if it were, is it at all like what those Authors describe, a Beetle or Ladycow. It is a very small Fly of the
two

two-winged Tribe ; it has no Cases of the Wings, such as *Lewenboeck* describes, nor indeed any thing analogous to any Part of either his, or any of the others Descriptions, nor was ever seen, or so much as supposed to exist by any of them.

The Female Animal, which we call Cochineal, when full grown, is impregnated by Copulation with the winged Male as she remains fixed on the Plant ; after this the Male dies, and from this Time the Female has the Embryos encreasing in Magnitude within her. *Lewenboeck* was a little out in his Egg Story, the Creature is viviparous, and indeed, without our having been particularly informed of this, any body but himself would have discovered as much by what he saw : The Bodies he describes being evidently not Eggs but Embryos. The young ones they produce are partly such as are to remain during their whole Lives in that Form, only increasing in Size ; this is the Case in regard to the Females ; partly such, as after a Time are to pass the proper State of Chrysalis, and come forth the winged Males, which are to impregnate the Females for another Generation.

The young Female Cochineals, like all the other Gall and Progall-Insects, run about the Plant for some Time, and afterwards fix themselves to one Spot, from which they never remove ; they do not erode the Leaves, but only plunge a Kind of Trunk, they are furnished with at their Head, deep into them, and by the Means of it, suck up the Juices destined for their Nourishment.

They are quick Breeders, and furnish several Gatherings in a Year. Every Female brings forth each time some thousands of young, the Females of which soon arrive at a State of Impregnation, and are fit for collecting for Use. The rainy Season is all that the Natives have to fear for them ; they house them from it, cutting off the Leaves on which they are, and hanging them up till better Weather : These, like the Parts of many other succulent Plants remain fresh a long Time, and supply them with Nourishment till they are full of Young, and ready to bring them forth on being placed on other Plants of the same Species, in the open Air at the Return of the good Weather.

PART VI. BOOK VI.

SOCIETARIAN DISSERTATIONS
on SHELL-FISH.

CHAP. I.

Of Cockle-Shells that have no Cavity in them.

THE Study of Shells was never more in fashion than it is at present; every body effects to understand them; and some, who have brought themselves to believe that they do so, have wrote upon them. *Dargenville* has given some good Figures, and *Lister* has convinced us, that he had been at the Pains to get a thorough Knowledge of the Bodies themselves. Of all the Authors who have not written on the Subject, we have most Occasion to blame the learned and ingenious Mr. *Strachan*, who, in many Parts of the Philosophical Transactions, has given us Proof of his Abilities, to have treated the Subject truly *en Societarien*.

If there is a Man of this Age, who emulates his Fame in this Branch of natural History, it is the often celebrated Mr. *Baker*; a Gentleman at least as truly qualified to write on the Subject as any Man, except Mr. *Strachan*, ever was; and who, we are informed, is not without some Thoughts of obliging the World with such a Treatise, after his Book of Salts, and of other Subjects naturally connected to those, and arising from them; at least as naturally, we hope, as *Isis* and *Osiris* from Tar Water *, shall have received its due Share of Encomium from our Hands.

The Fragment of an Oister, which this Gentleman carefully preserves in his Museum, under the Name of a *Nautilus*, in spite of all that

* See the Bishop of Cloyne's *Siris*.

that can be said to him against it, may alone speak his Knowledge equal to any Man's, except the Author of the Account from which all this is but a Digression, published in the two hundred and eighty-second Number of the Philosophical Transactions, which tells us of Cockles as big as *Oculi Cancrorum*, which have no Cavity in them: We would ask the worthy Successor of Mr. *Strachan*, commemorated with due Honour in this Paper, to explain to us in what Part of these Shells the Animal lived, were we not able to inform him that these Cockles were no other than *Umbilici Veneris* or *Operculums* of Shells, not entire Shells themselves; an Information which the candid Reader will easily find was the real Business of this short Chapter.

C H A P. II.

Of the Origin and Formation of Pearls.

PEARLS have been in Esteem as Ornaments, and for their Medicinal Virtues in all the Ages we have any Account of. Many Things are in common Use, however, the true Origin and Formation of which are unknown. The Antients supposed Pearls to be petrified Dew Drops, which the Fish rose to the Top of the Water at certain Times, in the dead of a cold Night, to receive as they fall into the Sea, and which hardened in its Body to the State of the perfect Pearl.

This Account, tho' it had satisfied many of the Philosophers of Antiquity, whose Names make a Figure at this Time, would not go down with the discerning and philosophick Genius of the Gentlemen of the *Royal Society*: Tho' they could agree to the Doctrine of the Water's freezing into Crystal, as is delivered in one of their Papers, not omitted in these Animadversions; yet they could never be brought to agree to the petrifying of Water into Pearl; no one of their Members having ever told them that he had seen it done. A new System of the Formation of these precious Bodies was to be found, and Mr. *Christopher Sanders* has delivered them one, which they have printed in the hundred and first Number of their Transactions.

This Gentleman tells us, that the Pearl Shells breed in fresh Water, and that they resemble very much the common Muscle, but that they are

larger, and that the Fish in them looks like an Oyster. This Fish, he tells us, produces a Multitude of Eggs, which are *like those of the Cray-fish*, and are some white, and others black, but that these black ones are white also when the outer Coat is taken off. The greater Part of these Eggs, he tells us, when ripe, are thrown out of the Body of the Animal, and grow to be like the Parent Animal: But now for the Origin of Pearls: It is only a Part of them, he says, that are thus thrown out, the rest adhere to the Matrix of the Animal, and there are fed by the poor Creature against its Will, and grow to be Pearls of various Sizes.

Pearls therefore, according to this System received by the *Royal Society*, are only *Muscles Eggs*, *nourished longer than they should have been*.

The Society, however, could not but believe it, because the Author tells them he had it from *Henricus Arnoldi*, a Person of great Veracity who had made the Observation himself: We suppose he had kept the Pearl-shells in Glass Jars, as Mr. *Arderon* did his Fish, and opened them every now and then, to find the Progress of Nature in the Formation of these Bodies.

What ought the World to think of a *Royal Society* who could swallow this Account as glibly as a later Set of Members composing the same Body did Mr. *Baker's* microscopical Account of the Seed of the Bidens, under the Name of a *Water Insect*.

Pearls are indeed no more the Eggs of the Creature that is so unhappy to produce them, than Bezoars in the Stomach of Goats, or Stones in the Body of Men, are the Eggs of the one or the other. They are, in Reality, morbid Concretions of a hard Matter, perfectly like those Stones both in their Origin and Formation; they are, like Bezoars, composed of a Multitude of Crusts, surrounding one another; not of petrified Whites and Yolks, as Mr. *Sanders* and Mr. *Arnold* would inform us; and it is owing to this coated Structure, that, when their Colour is lost by Age, they may be rendered bright again, by stripping them of their external Crust, which is very thin, and comes off very regularly, leaving the next, underneath it, which has not been affected by the Air, to exhibit all its Lustre.

We cannot pass over this famous System of the Origin of these Bodies, without observing the great Similarity there is in the Writings in general of this very judicious and learned Body. This Paper, like the Generality of the rest, is not only false in the System it advances, but in every thing that it alledges in favour of that System, and even in every Particular that it records of the Animal in Question.

It

It is to be observed, that many different Shell-Fish produce Pearls, tho' they are not of any great Value in some, and in no Quantity in others. When People mention the Pearls found in any of these Fish, they add its Name by way of Distinction, but when they treat of the Pearl Shell, using it as a generical Term, they cannot be supposed to mean any thing by it, but that Shell Fish from which the Pearls are now taken in the great Fisheries.

We mention this to obviate any Subterfuge in the Answer which the *Royal Society* have engaged their Honour to make to this Work, before they see it, on the Subject of what is meant by the Term Pearl-Shell in this Paper ; but having thus ascertained its meaning, we are to observe, that the four capital Assertions in the Paper, in regard to it, are false ; for 1. That the Pearl Fish does not live in fresh Water. 2. That it is not at all like a Muscle. 3. That its Eggs are not like those of Crayfish : and, 4. That those Eggs do not petrify into Pearls. The Whole, however, is truly Societarian ; and it would not be difficult to find Testimonies of Facts in the Things commemorated by that grave Body, for every Particular in the System.

Why should not the Egg of a Shell-fish be as likely to petrify in the Matrix of the Animal, as a Child be turned into Flint and Plaster Stone in its Mother's Womb ; a Fact recorded very early in the Transactions, and quoted very lately in them by the Right Rev. the Bishop of *Cloyne*, to prove the Possibility of the Water of *Lough-Neagh* in *Ireland* petrifying Wood. Dr. *Beal*, in another Paper, gives an Account of a Stone taken out of a Woman's Womb, which even his own Description of the Weight, Size, Shape and Colour of, tend to nothing so much as to prove that it was a petrified Egg, such as we have an Account of a Woman's laying two of, quoted from *Olaus Wormius* in the same Transactions.

In short, if we were to recapitulate only from the few Papers that have fallen under our Consideration in this Attempt, the parallel Facts to these in this Pearl-Paper, it would be easy to prove, that notwithstanding all that we shall be able to say to invalidate the System, it must be true, if the Generality of Things recorded in the Philosophical Transactions are so.

It is to be observed, that many different Shell-Fish produce Pearls, tho' they are not of any great Value in some, and in no Quantity in others. When People mention the Pearl-shell, they add in Name by way of Distinction, but when they name of the Pearl-shell, they add as a general Term, they cannot be supposed to mean any thing by it, but the Pearl-shell from which the Pearls are now taken in the great Fisheries.

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Why should not the Egg of a Shell-fish be as likely to perish in the Matrix of the Animal, as a Child be turned into Fish and Plaster Stone in its Mother's Womb; a Fact recorded very early in the Transactions, and quoted very lately in them by the Right Rev. the Bishop of Cloyne, to prove the Possibility of the Water of Long-Yang in Ireland petrifying Wood. Dr. Blay, in another Paper, gives an Account of a Stone taken out of a Woman's Womb, which even his own Description of the Weight, Size, Shape and Colour, of, tend to nothing so much as to prove that it was a petrified Egg, such as we have an Account of a Woman's having two of, quoted from Oliver Wormin in the same Transactions.

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PART VII

OF VEGETABLES and Parts of
VEGETABLES

CHAP. I

PART VI.

THIS is a Branch of natural Knowledge, which, it will appear, that the Royal Society of London have looked to very deeply into, that their rejecting the Linnaean System of Botany, which offered by its Author, will no longer be regretted.

VEGETABLES

PART IV

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VEGETABLES

OF VEGETABLES, and Parts of
VEGETABLES.

CHAP. I.

*A most amazing Discovery concerning the Seed of the
Gramen Tremulum, or Quaking Grass.*

THE Royal Society of London has been famous beyond all the learned Bodies in Europe, for the Discovery of Things which neither the People who discovered them, nor any body else, ever saw : It is no small Share of this Reputation that it owes to the Author of the Paper that is to be the Subject of our present Animadversions.

If we add to his own Merit in this Way, that of the several Correspondents, who, under his Patronage and Inspection, at present favour the Society with their Observations, it must be allowed, in spite of the utmost Partiality and Prejudice, that no Member of the present or of any preceding Time can dispute with him the Title of the first Man in the List on this Head.

The amazing Discovery that has at this Time put us in mind of doing this publick Justice to Mr. *Henry Baker*, is, an Account of, as he tells us, a perfect Plant in Semine : It does Honour to the four hundred and fifty-seventh Number of the Philosophical Transactions.

Mr. *Baker* is so great a Master of the Art of saying a great deal about nothing, that we can scarce recollect any Man who has it in so high Perfection. If it were not for the Intimation conveyed in the Title of this Paper, a Man might read near two-thirds of it before he found out what it was about. The Author spends all this in a very wise Dissertation upon Animal and Vegetable Generation ; but as this

a Subject that neither he nor any body else are likely ever to know any thing of, he has our free leave to talk about it as long as he pleases.

After acquainting the Society with many Things, which he does them great Honour in supposing they were before ignorant of, he proceeds to observe, that he had long wished in vain, to see some Plant in its parent Seed, as a means of letting great Light into this abstruse and unintelligible Matter ; that, after a great Number of Trials which he had made with sufficient Accuracy, he had failed in the Attempt; when Chance, the great Discoverer of all great Things, threw this in his Way, at a Time when he was thinking nothing about it.

As he was one Day examining the *Seed* of the *Gramen Tremulum*, he tells us, on some other Occasion, he made the strange Discovery, that its Husk was transparent at the Edges: Little thinking what would follow, he slit it longitudinally, and then he observed something small between its separated Sides; still unsuspecting what this might be, he went, he tells us, to pick it out with the same Instrument with which he had opened the Way to it, and by the greatest Accident in the World, he found that the Point of the Instrument had opened a thin membranous Case, in which was included the little Thing he had been so long professedly searching after in vain. There was nothing less he tells us, than a *perfect Plant in it*, arising from a *double Root* in the Basis of its Case, with *two Stems* of equal height, each having many Leaves on it, perfectly like those of the Grass it belonged to. This is the *Plant in Semine* described by Mr. *Baker*, and which Mr. *Baker* boasts to this Day as the greatest Discovery of his Life: This is the Plant in Semine which he shewed to the wondering *Royal Society*; for which that Society have done, and still do, him more Honour than almost any Member of it for any other Discovery; and of which we have a most pompous Description in the Philosophical Transactions, from which we have here quoted the essential Passages, with an engraved Figure, explaining the Description and shewing the Plant in and out of its Case.

The Author acknowledges that he was himself so charmed with the Discovery, that he could scarce believe his Senses that it was a Fact, but that knowing how subject to Error and Fallacy microscopic Observations are, he viewed it again and again, in all Lights, and, in spite of all his Doubting and Distrusting, found at last that it was a Reality.

After

After this he tells us that he proceeded to cut open many other Seeds of the *Gramen Tremulum* in the same Manner, in Hopes of separating the *little Plant* clean and entire, which he at last effected; and, as a Proof of his Love and Esteem for the Society, he, on reading his Paper to them, presented them also with a Specimen of a *Plant* thus separated, and of another yet in its Case. He says, he cannot deny himself the Boast that he never met with any Experiment that, so plain as this, proved the *Plant* to exist in the Seed of its *Parent*, and very modestly submits it to the *Royal Society*, to say how far this may assist in explaining that dark Business, Generation, of which he had before written so clearly.

Such is the Account of this famous microscopic Discoverer and Naturalist, and such the Reception it met with in the *Royal Society* of *London*. It remains to enquire what this little Thing that he has made all this Bustle about is. We are very unwilling to rob this Gentleman of so much Fame, and the *Royal Society* of so much Satisfaction, as this Discovery has been the Source of both; but we must affirm that neither Mr. *Baker* nor the *Royal Society* ever saw the *Plant* in *Semine* that they are so fond of the Notion of, nor even the very *Seed* that should contain it.

We do not mean that the very learned and ingenious Mr. *Baker* took any other Plant for the *Gramen Tremulum*, that would have been a Mistake the *Royal Society* itself might have set him right in, for scarce a Boy of six Years old but knows the quaking Grass; but unluckily, tho' he did not mistake something else for the Plant, he mistook another Part of the Plant for the Seed.

What he describes as the Plant in *Semine* is no other than a Part of the Flower of the Plant, tho' all the wondering, the applauding Society were not able to inform themselves or him of so much.

The Flower of the *Gramen Tremulum* is composed of two Valves, one large and the other small, which, when they open, discover three Capillary Filaments with oblong Antheræ on their Tops, and a Pistil, consisting of a roundish Germen at the Bottom, and of two Styli, arising from this, terminated with Plumose Stigmata. These last their Time, as in other Flowers, to do their Office of Impregnation, and when that is over they fall, and the two Valves remain, and serve as a Covering for the Seed, which then begins to ripen, and is, when fully ripe, a very small one, roundish and somewhat compressed in its Figure. A Number of

these Fructifications are contained in one common Glume or Cup, but each Fructification produces only a single Seed.

These are the Characters of the Flower of the *Gramen Tremulum*, and these will easily let us into the Secret of what Mr. *Baker's* Merit in this Discovery is. It is plain, by the Words of his own Description, that he mistook the Flower of the Plant for its Seed: This Flower was at that Time unopened, and was what he so dextrously cut open with his Lancet, and called a membranous Case. This Gentleman's Ideas of a Seed must be very strange ones, that he could think a thin, tender, membranous Case was one: When he had opened the Flower there was nothing for him to see but the internal Parts of it, some of which he has figured tolerably distinctly, tho' he has described them under very odd Names. His Plant in Semine is no other than the Pistil of the Flower, whose Germen makes what he calls the *Root*, and its two Styli with their Stigmata, the two Stems of equal Height, each having, as he says, many Leaves on it perfectly like those of the Grass itself. It would have been too hard to expect a *Royal Society* to understand the Characters of Plants, tho' *Linnaeus* has already described them; but one would have thought that they might have discovered at least, that what Mr. *Baker* calls Leaves perfectly like Grass, and has figured growing on the two Stems of equal Height, were much too numerous for the Plant itself when full grown, and were not like either Grass or Leaves at all.

It is very evident, by the State in which the Flower was at the Time of Mr. *Baker's* making this amazing Discovery in it, that the Seed could not be so much as perfectly formed in it. It is not therefore too bold an Assertion, to affirm that neither he nor the *Royal Society* ever saw the Seed of this Plant, in which they suppose they have seen the *Plantula Seminalis*.

It is not singular in this Grass to have this Sort of Fructification, it is common to a Multitude beside, and in many of them is much more perfectly distinguishable than in this. There are some of them, indeed, in which what are in this Paper called the two equal Stems of the Plant in Semine, hang so far out of the Flower, that, instead of requiring Lancets and Microscopes for the Separation and Discovery, they may be seen at ten Yards Distance.

Of this Kind are the Discoveries that have endeared Men to the *Royal Society*: And it is vastly to the Honour of the President at this Time, that he has distinguished the Author of this as his peculiar Bosom Friend
and

and Adviser. How glorious is the Society likely to become, that has a Genius like this, to determine which of the Papers offered to it shall, and which shall not, be read.

We are not to do Honour to the *Royal Society* only for the Pride they took in the renowned Mr. *Baker*, after this Discovery, the Author claiming an equal Share of our Eloge, for the Pride he took in himself about it. Conscious of the Reception it would meet with from that wise Body, he shews himself to them in another Capacity at the Conclusion of his Paper; Mr. *Baker* the Microscopian, or Mr. *Baker* the Philosopher, is not all that they are to admire in him; he gives them a Specimen of Mr. *Baker* the Poet. He has the Honour of being the very first Man, who, in the *Philosophical Transactions* has quoted Verses of his own; but they were so good, and so applicable to the present Occasion, that he could not deny himself the Pleasure of giving the Society the Pleasure of hearing them.

Each Seed includes a Plant: that Plant again
Has other Seeds, which other Plants contain;
Those other Plants have all their Seeds, and those
More Plants again successively enclose.
Thus ev'ry single Berry that we find,
Has really in itself whole Forests of its Kind.
Empire and Wealth one Acorn may dispense
By Fleets to sail a thousand Ages hence;
Each Myrtle Seed includes a thousand Groves,
Where future Bards may warble forth their Loves:
Thus *Adam's* Loins contain'd his large Posterity,
All People that have been, and all that e'er shall be.

Lines like these, read by the Secretary of the *Royal Society*, must needs have had a very surprizing Effect. It is great Pity however, that Mr. *Baker*, with all his Address, could only find the Way of doing himself a partial Justice, as to this Talent, in so publick a Work as the *Philosophical Transactions*. We are less tyed down to Forms in these loose Remarks, and may do him that Justice which he was not permitted there to do himself, by shewing the World, that he is as great a Poet in the several other Styles as in this: His Genius indeed seems of a very unlimited Kind, and we are apt to believe a few Quotations from his other Poems,

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published in a Collection, entitled, *Original Poems, serious and humorous*, By Mr. Henry Baker, will prove, that he is as good at the Lyric as the Epic Poetry, as good at the Eclogue as the Ballad, and as good at either as at Philosophy. His Excellency in the Eclogue Way is distinguishable in a particular Manner throughout a whole Poem, which he modestly entitles only *a Tale*, and calls a Case of Conscience: But we are to give Examples: Nothing else can do such an Author Justice. The very pathetic Scene of a Wife in Labour is introduced in this Piece, and the Wife, in the Midst of her Anguish, exclaims,

John? oh *John*, she cries,
And thrusts her Fingers in her Eyes;
Indeed you are a naughty Man
To put your Wife to all this Pain,
But you shall ne'er do so again:
And then she sigh'd most grievously,
Good by t'ye, *John*, for I shall die.

So much for the Affecting; but the Author does not less excel in the Description of Business; his Account of the Gossips at the Labour will be an abundant Proof of it.

All are employ'd: This sets the Cradle;
That stirs the Caudle with a Ladle;
One airs the Clouts and makes them ready;
Another waits to take the Baby;
Some bid her be of hearty Chear,
For her Delivery is near;
While others pity her Condition,
And fain would send for a Physician.

An ill-natured Reader may be apt to suspect, by the Introduction of the Ladle in this Place, that the Author was in distress for a Rhyme; but we are to inform such People, that this Author is the last in the World that ought to be suspected of that, since not only the *ready* and the *Baby* in this Quotation, but numberless other Instances might be produced, to prove, that he never troubles himself much whether there are any Rhymes or no. We are not to accuse him indeed of playing the Fool with them, when he has got any; no Author in the *English* Language appears perhaps equally fond of Jingle when it comes easily, or has shewn
more

OEconomy in the Use of it. Who so elegantly as Mr. *Baker*, ever contrived to make Rhymes serve twice over in the same Stanza ? we are not insensible that other meaner Genius's have attempted it, but we would ask, who ever equalled our Author in it ?

Why art thou dress'd my lovely Maid,
In Gold and Gems and rich Brocade ;
When Gold and Gems and rich Brocade
Conceal thy Charms, my charming Maid:

The Reader may do Mr. *Baker* some Honour upon the OEconomy of Words as well as of Rhymes in these beautiful Lines, but we shall not suffer his Character to be injured by a half Praise: We shall not suffer this to stand as an Instance of an OEconomy of which we are able to produce so vastly greater. What should one think of a Man who would propose writing four Lines that should have but twelve Words in them, and not one of them consisting of above two Syllables. Mr. *Baker* has fairly executed it.

Health to *Anna* Nature's Treasure,
Health to *Anna*, charming Fair,
Health to *Anna*, Health and Pleasure,
Health and Pleasure void of Care.

We are to do Honour to the sparing Use of Thought, as well as of Words that is manifested in this Quotation, but Mr. *Baker* is an OEconomist in every thing. It would be easy to enlarge on this entertaining Head, but we are unwilling to anticipate a Pleasure the Reader will have in looking over the Works of an Author, of whom we have given such a Specimen, and in whose Writings there is nothing of that Inequality that has been so frequently complained of in Men of Genius. We esteemed it a Debt to this Gentleman's Merit to say thus much, and may conclude our Account of himself and his Productions by observing, that his Philosophy seems every Way equal to his Poetry, his Poetry to his Philosophy, and every Part of each to every other Part. The Use of Microscopes he has indeed, in a Manner, claimed to himself; and whoever will examine his separate Pieces published on that Subject, will find them equal to every thing else in his Character. We have in the Business of this Paper, indeed, one very eminent Instance of the great Talents he has for making Discoveries by them; another scarce

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inferior to this we have elsewhere celebrated in this our good-natured Work, under the Title of, *An Account of the Bakera*: Others in sufficient Number will also be occasionally mentioned hereafter: Upon the Whole, what may we not expect from Microscopes, now that we have such a Genius among us for the making Discoveries by them, and such a *Royal Society* for those Discoveries to be communicated to.

C H A P. III.

Of a miraculous Apple-Tree.

THE *Royal Society* of *London* have always distinguished themselves by the Respect they have paid to Miracles, by their Belief in Impossibilities. They have always had the good Fortune also to have some one Place, some one Author, famous for furnishing them with Accounts of this Kind. *Norwich* is the the *City of Wonders* at this Time, and Mr. *Arderon* the Relater of them: In earlier Days *New-England* was the Land of Miracles, and the honourable Mr. *Paul Dudley* engrossed the Business of communicating them to the only Place in the World where they could be received.

We have, in the Course of these our Animadversions, recorded many of these Miracles, and done this Author the Honour that was due to him, on account of them. The Subject of our present Praises stands in the three hundred and eighty-fifth Number of these immortal Works. Mr. *Dudley*, after giving an Account of many Things which People might possibly have guessed, whether he had given any Account of them or not, concludes his Paper with a History of another Strain.

When we find a Man in the Philosophical Transactions relating something that he tells us he saw himself, we are always to be very suspicious of the Truth of it.

In the present Case Mr. *Dudley* assures his Brethren, that there was in an Orchard in that Place an Apple-Tree, which annually bore a very considerable Quantity of Fruit, tho' it never had a single Blossom, or any thing like a Blossom upon it. He will not suffer the *Royal Society* to doubt of the Truth of what he tells them, or to suppose he writes, as most of their Authors do, upon Hearsay; he assures them

them, that for three Years successively he went into the Orchard frequently, and examined it strictly, both at the proper Time of its flowering and at other Times ; like those good People, who, when they have searched all the possible Places a lost Thing should be in, search the impossible ones ; but he assures us, in consequence of these several strict Observations, that the Tree in that whole Time never had so much as one Blossom upon it, either in Summer or Winter, either in Spring or Autumn, or at any natural or unnatural Time.

In the Course of these Observations, he assures us, that he daily examined the Tree, till he annually saw the young Apples begin to appear on it, which they did, he says, in Plenty, at the Time that the other Trees, which had borne Flowers, produced theirs ; and that the Apples ripened upon it like those upon the other Trees : He adds, that tho' he had observed this Apple-Tree only for three Years, there were several of the People in the Neighbourhood, who assured him, that it had gone on in the same Way for forty Years, bearing Fruit regularly every Year, but never producing any Flower.

The Author is afraid that somebody should invalidate the Miracle by supposing the Tree to be a grafted one ; this, he seems to think, would take away all the Cause of wondering at the want of Flowers : We cannot pretend to enter into his Reasoning for this Supposition, but are very happy to find him cut down the very Foundation of it, by assuring the Society, that the Tree had never been grafted at all : He concludes the Paper in a Manner worthy all the rest of it ; observing, that he could not perceive by his Examinations into the Nature of the Fact, but that in all other Respects this Tree fructified like other Apple-Trees. It is not easy to conceive what the Author means by this Assertion, or in what respects it is that the Fructification of a Tree, from which all the Organs of Fructification are taken away, can be like that of those that have them.

The Fructification of all the Vegetables in the World is affected by means of a Farina lodged in the Apices, serving as the Male Part ; which, when mature, is dislodged from them, and makes its way into the Pistil or Female Part, in which are lodged the Rudiments of the Seeds : How therefore the Fructification of a Tree, which had none of all these Parts, was like that of others which had them, is hard to determine. In some Plants these male Parts alone are in some Flowers, and in others the female only ; in some Plants they are both in the same

Flower : this is the Case of the Apple-Tree ; it agrees with the Pear and Quince in its Fructification, having five Stili or female Parts to receive the Farina and convey its Influence to the Germen of the Fruit which is placed under the Cup of the Flower, and round about these female Parts twenty Stamina, supporting as many Apices, containing each its Share, and that not a small one, of this impregnating Farina. This is the Method by which Nature has allotted the Fructification of the Apple-Tree to be carried on ; these the Organs she has furnished for that Purpose ; but Mr. *Dudley* gives us an evident Proof, that all this Apparatus is unnecessary, and that an Apple-Tree will carry on its Business of Fructification full as perfectly without it. What a Bustle has the World been making of late about the new System of Generation, proposed by Dr. *Abraham Johnson*, in his *Lucina sine Concubitu*, and yet what more is there in it than is already advanced by this true and genuine Societarian Mr. *Dudley* ? What Pity it is, that the Gentlemen of the *Royal Society* will not read their own Works : instead of all the Censure they have passed upon that very learned and grave Author, all the Opposition they have made to his System being brought into Use, how much nobler a Triumph would it have been to have proved to the World, that what he wanted to have palmed upon them for a new System, was but a Thought stolen from their own Transactions. For our own Part, we believe it to be full as possible for Women to be made with Child without the Help of a Man, as for an Apple-Tree to be made with Apple without the Help of the impregnating Farina. Dr. *Johnson* seems to allot the whole impregnating Quality of Winds to the Western Breezes, and we dare say, if the Society will be at the Pains to send over to *New England* to enquire, they will find that Mr. *Dudley's* Apple-Tree was exposed to the same Quarter. Could they have suppressed their Resentment till an Express could have returned with the Confirmation of so important a Truth, signed by the Parson, Church-wardens, and Constables of the Parish (a not uncommon Way of proving Things to the *Royal Society*) how glorious a Triumph over this arch Enemy would they have had ! how different would have been the Effect from that of their present Efforts, which we are afraid will prove vain, while the Laugh of the World is against them ! what a Pity, that this sagacious Body could not have Patience for such an Event ! but great Genius's will be precipitate.

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The History of the Apple-Tree is, as all the societarian Falsities are, well attested by People who had been Witnesses of the Fact. The Author has also had the Address, like *Manfridus Septalius*, hereafter to be celebrated, to lay the Scene far enough off; the same Form of Refutation, however, may serve for both. It is an acknowledged Fact in Law, that *any thing may be proved by Evidence*; and we find, by a careful Perusal of the Transactions of the *Royal Society*, that it is not less true, tho' not quite so barefacedly owned, in Philosophy: When Evidence is so cheap, it is worth less than it costs. He who knows the System of Vegetable Generation, who knows, that, previously to the Growth of any Fruit, a fine, subtle, impregnating Farina is to be formed in certain little Apices, created for that Purpose, and is to be received into another Part of the Organisation, there to give the Principle of Life to the otherwise useless Embryo; who knows, that tho' the female Organs of a Flower are ever so well formed, if the Parts that are to contain this impregnating Dust, are cut off before they shed it, there can no Fruit succeed; will he believe that Fruits can be produced, where not only these, but even the very female Organs, the very Embryos of Fruit never existed? Surely those Transactions have very little Title to the Epithet Philosophical, which can give Place to such a Story, tho' attested by a thousand Witnesses.

C H A P. III.

An Account of the Farina Fæcundans of the Yew Tree.

TH E *Royal Academy* of Sciences had done themselves great Honour by their Discoveries of the Nature and Use of the *Farina Fæcundans* in Flowers; and Figures and Descriptions of a great Number of Species had been given in the *Acta Eruditorum*. The *Royal Society* of *London* were behind hand with their Neighbours on this Head, but they promised themselves to rival the best of them, by the Labours of the Author of this immortal Paper; a Gentleman encouraged and patronized by Mr. *Baker*, under whose Auspices also this particular Dissertation has the Honour of shewing itself in the Transactions.

It had been a long Time supposed, that the Farina or Dust contained in the little Heads that stand on the Stamina of Flowers, was an excrementitious, and wholly useless Matter, when the Discovery was made, not very many Years ago, that it was an essential Part in the OEconomy of the Plant, being no less than the male Part of the Flower, and serving to impregnate the Seeds in the female Part or Case of the Pistil : In consequence of this Discovery it was that the Fructification of Plants, or the Method of their propagating their Species was first understood.

The Author of this Paper, which stands in the four hundred and eighth Number of the Transactions, observes in his setting out, that he had engaged himself to advance the Knowledge of this Part of Natural History, which he gives his Account of the Farina of the Yew-Tree as a Specimen of his Abilities in, frankly acknowledging, that in the whole Course of his Observations, he had not met with any Thing equal to what he saw in it.

He tells us, that, perfectly convinced of the Doctrine, that *every Flower has its Farina*, he determined to examine that of this : And in Consequence, he tells us, that *no two Globules of it were alike*, but that it *much resembled Gum Arabick or Flower of Brimstone*, and *when laid in Water burst in a very various Manner*. This is the whole of the amazing Discovery this Gentleman had made of the Farina of this Tree, but this is not all the Business of his Paper : He gives a very long and unintelligible Description of the Flower itself, and concludes with telling the Society, that he had like to have forgot the most material Point of all, which is, that *this Flower has neither Apices, Stamina, nor Stylus* ; he concludes, that this is the Reason why *so much Farina is always shed from it*, and promises the Society, that he will speedily examine its Fructification.

All this is contained in the Compass of four Lines and a half ; and we think we may with Justice do them the Honour to say, that they are the richest Lines in the Philosophical Transactions.

The Society received the Account with great Pleasure and Satisfaction. The President returned the Thanks of the Society to Mr. Baker, and he was desired, to return them to the Author, who was solicited to continue his accurate and useful Observations. We, however, who are less easily satisfied than this grave and learned Body, do declare, that all we can make out by this Paper, is, that neither the Author,

nor the Man who patronized it, nor the Society who heard it, knew any thing of the Subject it was written about ; for if any of them had, it would either not have been written, or not have been recommended to the Society, or not have received the Applause of it, or have been suffered to be printed.

What ought the Society to have thought of a Man who promises to examine the Impregnation of a Flower, which, he assures them, has no one Organ of Impregnation, either male or female, in it ? or what ought they to have determined of him, for talking of no two Globules of a Farina being alike, and of a vast Quantity of it being shed, because Nature had given no Organs for producing any of it ? If this Gentleman's imaginary Discovery could have come to any thing, the very first Principle of the believing the Farina an useful, not an excrementitious Matter, would have been overthrown ; since that was originally founded on the several Globules being all of a Shape, and on their being produced in regularly organized Parts of the Flower.

The World will be able to judge pretty justly of the Works published under the Countenance of the *Royal Society*, when we shall have observed what is the real Case, in regard to this Flower, by way of Contrast to what is in this famous Paper declared to be so.

The Yew-Tree produces two Sort of Flowers. The one Sort contains all the male Organs of Generation, the other all the female. The male Flower contains a very great Number of Stamina, which grow together so as to form a Sort of Column at the Base, they are terminated by Apices of a very singular and beautiful Kind ; they are of a flatted Form, and are divided each into eight Segments by little Notches about the Edge, which appear more plain when the Farina has been shed, than before. In the female Flower there is a Germen of an oval Figure, pointed and terminated by an obtuse Stigma. Such are the Organs said by this curious Author to be wanting in this Flower, even after he had examined it by a Microscope. We see by this, and by some other of the Papers in these Transactions, written by Mr. *Baker*, what infinite Use the Microscope is of in such Hands.

C H A P. IV.

Of Petrified Roots of growing Plants.

START not, gentle Reader, at the Contradiction and Absurdity contained in the Title to this Chapter: If the *Royal Society* of *London* could believe the Possibility of such a Miracle, surely thou mayst hear the Relation of it.

The ingenious and philosophic Author of the Paper in which it is commemorated is Mr. *Stubbs*; it stands as early as in the thirty-sixth Number of the *Philosophical Transactions*, and as it has never yet been contradicted by the Body under whose Auspices it was published, there is great Reason to suppose that they still believe it. The Author informs us, that as to the Plants, whose Roots are stony, it is to be noted, that some of them have Roots entirely petrified, or consisting only of Stone, with nothing vegetable about them, but that others have them partly stony and partly vegetable: He adds also, that this petrifying Matter is not peculiar to the Root, but that it extends even to the Branches, covering them while yet growing, with a stony Crust, which is sometimes movable on them like Beads on a String, sometimes fixed; and that it sometimes forms itself into Stars on several Parts of the Branches.

We are apt to imagine, the Reader need not be told that no Nourishment could be conveyed to a Plant thro' a Root which was of perfect Stone, and had nothing vegetable about it. But it may not be amiss to give the real History of the Fact which gave rise to this very remarkable Communication.

A young Fellow going over to the *West Indies*, to settle as a Physician, had an Ambition of carrying over with him the Title of Fellow of the *Royal Society*. He knew the Love of marvellous Relations was at that Time, as it still continues to be, the great Passion of this great Body: He had by Accident some of those Incrustations on Sticks, formed in several of our Springs in *England*: He knew how little the Society could be acquainted with any thing of this Sort, and he produced them as the Collection made with his own Hands, in his last Voyage to the
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Part of the World he was now going to reside in. Instead of telling them so simple a Truth, as that they were Crusts of stony Matter, deposited on Pieces of Stick that had fallen into the Water of these Springs, he assured them, that they were the Roots of Plants growing on Land, that it was frequent to meet with very flourishing Plants there, whose Roots were perfect Stone, and that their Branches frequently became so too, while full of Leaves and Flowers at their Extremities.

The Communication answered the Purpose of the Gentleman who made it ; he was dignified with *F. R. S.* and contriving to get back his Paper, under pretence of adding greatly to it when again on the Spot, he left to Mr. *Stubbs*, and such Gentlemen as Mr. *Stubbs*, the Scandal of setting their Names at the Head of a printed Account of such a Piece of Absurdity. Two Years passed and no News from the young Doctor ; at the End of this Time Mr. *Stubbs* makes a Voyage to *Jamaica*, he is particularly desired by the Society to enquire farther about these miraculous Plants, and scorning to be behind-hand with any Voyager of them all, he brings back, not any Specimens of the Petrification indeed, but a full and firm Assurance of the Fact, which he declares that he saw and examined, and does not omit even the minutest Particular of the Author's Description, but finds Bucks Horns, and Stars, and Strings of Beads upon the very growing Vegetables.

C H A P. V.

Of a Plant containing pure Mercury in its Roots.

THE World is indebted for this most curious and unparalleled Discovery to a Gentleman of a very sounding Name, Sir *Manfridus Septalius* ; it stands in the twenty-seventh Number of the Transactions ; and as the Society, in all the Time that has passed since, have never contradicted, or shewed any Distrust of it, we may charitably enough believe that they have continued to do it more Honour than ever its Author did, that is, that they believe it.

The Account runs thus: That in the Valley of *Lancy*, which runs between the Mountains of *Turin*, there grows a Plant called *Doroniscum*, in the Roots of which pure running Mercury is found, and may be

be separated by the simplest Process in the World. The Author tells us, that if a Quantity of the Juice of the Root be expressed and exposed to the Air to evaporate slowly, there will be found as much Mercury in the Remainder as there has been liquid Matter evaporated. He admonishes us, however, that this must be done in the Night, and at a Time when the Air is clear. What are we to judge of a Man who could write such a Paper? what of the Society who could receive it, read it, print it, and who, after such a Series of Years, should never contradict it? This great Body seems to have stood at that Time upon much the same Footing that it does at present, and the Author of this to have been much like some of its later Correspondents: He seems to have been ambitious of the Honour of being a Member, which, tho' a Matter of no great Consequence, not to say of Discredit, at Home, was, then, as it is now, a Feather in the Cap of a Foreigner; he seems to have known the Body he was endeavouring to get into, to be fond of Wonders, empty of Science, and therefore incapable of perceiving Contradictions of this Kind; he drew up an Account of a Thing which it was not necessary himself should believe, it was sufficient that they should do so. It is a Piece of History hardly worth enquiring into, but it scarce is to be doubted, but the Event was to his Wishes.

The Story seems much of a-piece with that of another Member of the same judicious Society, who, in some Collections for the Curious, as he entitles them, tells us of Plants of solid, pure, and virgin Gold, growing up in Corn-Fields, and spoiling the Reapers Sickles as they cut them down with the Corn: Lest the World should however be too favourable to this egregious Author, and imagine there was but one more Story similar to his, in all the Writings of the later Ages, it may not be amiss to quote a similar one from *Peter Pomet*. This Author, in his History of Drugs, tells us of certain Plants, growing to two Feet high, the Stalks of which, when beaten out into Threads, made an Asbestus, from which Cloth might be wove, that bore the utmost Effects of Fire without Hurt.

Septalius is not more punctual in describing the Place of Growth of his Mercury Plant, than *Pomet* of his Asbestine one, nor is the Author of the golden History behind-hand with either of them. They are all three of the same Authority. The societarian Author, here quoted, made the Experiment himself; the golden Plants, we are assured,
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are several of them, preserved in some body's Musæum ; and the Man who gathered *Pomet's* vegetable Asbetus was living when he published his Account, and as he takes great Pains to inform us, was a Man of Reputation and Fidelity. We make no Question but that there is as much Truth in the one of these as in the other. Nature proceeds by regular, stated, and unalterable Laws, and whatever contradicts them must be false ; it is in vain to say with the Society at present, that there are so many strange Things daily discovered that we ought to doubt of nothing ; if they were told of a Species of Eagles with three Legs, or of Horses with but two, would they believe it ?

are several of them, preserved in some body's Museum; and the Man who gathered Fowler's vegetable Athens was living when he published his Account, and as he takes great Pains to inform us, was a Man of Information and Fidelity. We make no Question but that there is as much Truth in the one of these as in the other. Nature proceeds by regular, fixed, and unalterable Laws, and whatever contradicts them must be false; it is in vain to say with the Society at present, that there are so many strange Things daily discovered that we ought to hold of nothing; if they were told of a Species of Eagles with three Legs, or of Lions with but two, would they believe it?

PART VIII.

MINERAL & FOSSIL

SUBSTANCES
PART II

PART VIII.

OF

MINERAL, or FOSSIL
SUBSTANCES.

PART VIII.

OF

I *T is evident that the Royal Society is as much acquainted with these as with Plants or Animals.*

SUBSTANCES

PART VIII. BOOK I.

FOSSIL SUBJECTS, treated of by
Members of the ROYAL SOCIETY:
Being DISSERTATIONS on Petrification, and
other general mineralogical Subjects.

CHAP. I.

*Of the Petrifying Quality of the Lake called Lough Neagh
in Ireland.*

THE general Assertion that the Water of *Lough Neagh*, in *Ireland*, has a Quality of turning Wood into Stone, has been as much controverted, and as strenuously supported as any Particular of the Natural History Kind in the World; we meet with extremely different Opinions concerning it, all asserted with equal Appearances of Certainty, and yet most of them evidently false. The great Dispute between these Authors is, whether the petrifying Quality is in the Water of the Lake, or in the Land thereabout; many Arguments have been produced in Favour of both Opinions, but we are for setting these Gentlemen all right, by informing them, that it is in neither.

So early as in the two hundred and sixtieth Number of the Philosophical Transactions, we have a Paper on this Subject by Mr. *Nevil*, aiming to prove that the Virtue lies in the Earth; and so late as in the four hundred and eighty-first Number we have another, attempting to prove that it resides in the Water; this is by Mr. *Simon*, a Gentleman who seems yet but half a Societarian, and who acknowledges that he is desirous to improve, and will most thankfully receive Advice. The World will not blame us, if a Person of this Turn, tho' in the wrong, meets

meets with a very different Treatment here from what we bestow upon the Generality of the Gentlemen of this not over modest Society.

That petrified Wood is found on the Shores of *Lough Neagh* after Storms is most certain, and also that it is at other Times found buried in the Mud of the Lake near the Shore: The Question is, how, and when it was petrified? Mr. *Simon*, in this Paper, fairly states the Opinions of others, and modestly enough delivers his own upon the whole.

It appears, by the oldest Historians of *Ireland*, that this petrifying Quality was believed to reside in the Lake in their Time; they tell us, that if a Stick was fixed upright in it, that Part which was in the Mud would be turned into Iron, that in the Water into Stone, and that above Water would remain Wood: This was long believed; but in Ages of less Credulity the Iron Part was rejected, and it was only believed, that Wood became turned into Stone by lying in the Lake: This is firmly believed by all the Neighbourhood to this Day, and is what the Author of this Paper labours to prove. Those who are against it alledge,

1. That Wood has been laid nineteen Years in the Lake, without receiving any Alteration, 2. That petrified Wood, wholly like that found in and about the Lake, is also found in digging, in many Places at a considerable Distance from it. These they take to be sufficient Proofs of the petrifying Virtue residing not in the Water, but in the Earth, and in that not only of the Bottom of the Lake, but of other Parts thereabouts.

Mr. *Simon* argues against this, that very large Trees are found petrified in the Lake, which must have fallen into it, and been petrified by the Water, as they have never been buried in the Earth at all: That many Pieces of Wood are found petrified in Part, and unaltered in other Parts, from the Water's having but begun to work upon them. He evades the Force of the Argument against it, from Stakes being not petrified tho' driven down on purpose, by observing, that the Virtue may reside in some Parts of the Lake only, where there are Springs, not in the whole; and argues, in favour of his own Side, that other Bodies beside Wood are petrified by the Water; petrified *Rushes*, petrified *Shells*, petrified *Clay*, and petrified *Sand*, being frequently found, as he says, thrown up on the Shores: He observes, that in Petrifications in general, some are made by a Kind of Stone, of the Nature of Lime Stones, which by its *burning and corroding Qualities*, destroys the Wood, and
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takes its Place, others by *ferruginous or metallick Particles* entering gradually into the Pores: Of the last Kind, he says, the *Lough Neagh* Petrifications are, which he could neither *reduce to Lime*, nor, with proper Ingredients, *procure a Vitrification of*. He observes, that there are Mines of Iron and other Minerals in the Hills about; and his System is, that Springs, running thro' the Veins of Ore, take up some Part of it, and are impregnated with *unctuous, saline, and metallick Matter*, and that some of these afterwards rising up out of the Bottom of the Lake in Question, *enter into the Pores of the Pieces of Wood, and other Things which they find lodged there*, and by degrees turn them into Stone.

That there are Springs in the Bottom of the Lake, he proves by the Observation of circular Places unfrozen, when all the rest is covered with Ice; these, he alledges, are the Places where the Petrifications are made, and adds that as no body knows, till the freezing, where they are, it is no Wonder that Stakes, fixed at Random in the Lake, are not petrified.

Tho' Mr. *Simon* takes all this Pains to prove there absolutely is a petrifying Virtue in the Lake, he does not deny but that there may be the same in the Ground also; he acknowledges, that he met with Pieces of Holly and Ash petrified there, but none, he says, imperfectly petrified, or part Wood and part Stone, as in the Lake: He adds, also, that the Lake may have been once larger than it now is, and that petrified Wood, now found under Ground at some Distance, may have been petrified, while the Waters of the Lake covered that Spot. He allows, however, that Exhalations may be sated with mineral Particles, and that they may petrify Wood buried in the Ground, and that *this is the real Origin of Wood found petrified in Sand and other Strata of the Earth*.

He observes, that the petrified Wood found on the Shores of the Lake is of a different Colour from that found in the Earth at some Distance, and brings his great Antagonist, Mr. *Smyth's* Words, to countenance his Assertion, of the Impossibility of their having been brought *six or seven Miles* and thrown in there.

Finally, he attempts to prove, that the Effect has been wrought on the Pieces of petrified Wood in the Lake by a mineral Spring, by observing, that *they do not ferment with Acids, and that they give a reddish Tincture to them*.

He adds his Opinion, that these Stones will not calcine into Lime, because they contain, beside the mineral Particles, a great Quantity of Sa-

saline ones, whose Sides being strongly attracted to each other, and closely joined, hinder the Fire from expanding the Pores of the Stones, and turning them into Lime.

Such is the Account given by Mr. *Simon*, of the Petrifications of *Lough Neagh*. The Society had been of Opinion before, that the Power of working this Change in Wood lay, according to Mr. *Nevill's* Account, in the Earth, but they seem now perfectly convinced that it is in the Water.

That petrified Wood is found both in the Water of this Lake and in the Earth thereabout, is unquestionable, but it does not appear to us that this is a Proof that either the Water or the Earth in which it is found have petrified it. Changes may have been made in Bodies long since, and they may have been removed far from the Places in which those Changes were made.

Petrified Wood is found in *Harwich* Cliff, and on the Shores of *Sheppy* Island, and in a hundred other Places, yet it does not appear from that, that either the Earth or the Water, either the Clay it is lodged in while in the Cliffs, or the Sea Water, which washes or covers it while it is on the Shores, has had any Share in making the Alteration; nay, there are unquestionable Marks of much of it having undergone the Change elsewhere, and having been deposited there afterwards.

I have received from the Author of this Paper, a very noble Collection of the petrified Wood of this Lake, and from some others, very fair Specimens of that found in the Ground, and of the Shells found petrified on the Shores of the Lake, and within the Strata of the Earth in digging; on examining these, they appear in general the original Product of very distant Climes. The Wood is indeed some of it Oak, and some Ash; Holly I have met with none; but the far greater Part is the Wood of *American* Walnut-Trees, as appears by comparing it with the Grain of that Wood; some of it also is Wood of the Pine, and other Pieces are of a Grain that differs from every thing we know, and probably has belonged to Trees either not yet discovered, or whose Wood has not been examined.

The Shells also are not those of the Lake, nor even of our own Seas, but Tellines and other Bivalves, of Species found living only on the Shores of the same distant Part of the World. Are we to suppose that these Trees and these Animals once lived here, or that, like the *American* Ferns, preserved in such Abundance in the Slates over our Coal Pits,

Pits, they were brought hither from their native Place at a Time when one great Sea covered both Countries, as well as the whole Space between them.

If we would rather give into the former Opinion, that they were once the Product of the Place where they are found, it does not plead at all in Favour of the petrifying Quality being at this Time either in the Lake or in the Earth, since the Species are now extinct; and in the Water, where the Continuation of the Effect ought to be most obvious, we see nothing of it, the recent Shell Fish of the Lake, which are numerous enough, never being petrified.

In fine, we are of Opinion, that there is no petrifying Quality in the Waters of the Lake, because Stakes, put down purposely for Trial, or on other Occasions, are not found at all petrified in ever so long a Time; and that there is no petrifying Power in the Earth thereabout, because Gate-Posts, and other Timber let into the Ground, and remaining there ever so long, is not found at all petrified by it.

To this it may be added, that petrified Wood is found in almost all Parts of this Kingdom, and much of it the same with that of *Lough Neagh*; and in particular, that Pieces of Wood petrified are sent over from *Pensylvania*, *Virginia*, and *Maryland*, so perfectly like the Generality of those of this Lake, that it is impossible to distinguish one from the other. I have several from these Places so perfectly like those of *Ireland*, that I am very certain Mr. *Simon* himself would on Sight declare them the Product of this very Lake.

It is evident, that all Petrifications must be owing to stony Matter sustained in a Fluid: Wherever such Matter is sustained in any great Quantity at this Time such Petrifications may be made, but we find that the stony Matter now found suspended in Water is principally sparry and calcareous, and therefore that our modern Petrifications are soft and burn to Lime. Whenever stony Matter of a harder Kind was sustained in great Quantity in Water, then was the Time for the Formation of hard stony and crystalline Petrifications. It does appear, that at the Time of the universal Deluge this was the Case, that stony Matter of all Kinds was then sustained in the Water that covered the Face of the Globe, and that it did enter with it into Bodies of all Kinds. This was the Time when Wood, whether in Fragments or in whole Trees, was most universally floating in Water, and this was unquestionably the Time when these, and the thousand other Petrifications we meet with,

were formed. The Place where the Bodies were originally produced, after this, furnished many other Parts of the World with them ; wherever such a Body of Water moved, it must have carried immense Quantities of solid Bodies with it, and wherever it stopped they would be deposited : To this alone it is possible to refer the finding Nautili, Inhabitants only of very distant Seas while living, now buried in our Clay, and other Strata ; and the Parts of various other Animals and Vegetables, which must have been brought from immense Distances, to the Place where these Bodies are now found : nothing less than an Inundation, which covered the Place where these Bodies are found, and all the Land between that and the Place of their original Production, could have lodged them there ; and every Circumstance of this so well agrees with the Account of the universal Deluge in the Days of *Noah*, commemorated by *Moses*, that there remains no Doubt of the Truth of a History of which there are such innumerable Testimonies. It is in the Waters of this Deluge that we suppose the petrified Wood and petrified Shells of *Lough Neagh*, and of the Land about it, to have received that Change, as well as those of other Parts of the World ; and indeed it appears ridiculous enough, that so much Pains should have been taken to account for the Petrifications of this Place in particular, when not only the whole Island, but the whole Globe of the Earth, so far as we are acquainted with it, affords the very same, in greater or lesser Quantity. An illustrious Member of the *Royal Society* was very scurrilously treated some Years ago, for proposing it to that Body, to explain what it was that gave the Earth about *Woolwich* a Quality of breeding Sea-Shells, (such was his Expression.) However it has chanced that this *Lough Neagh* Affair has escaped better, we are apt to believe that it is a Disquisition much of the same Kind.

We have a real Esteem for, and very good Opinion of Mr. *Simon*, as a Man desirous of knowing something more than he does, but we could have wished that the Society had, for their own Credit, known a little more, and not printed his erroneous and unphilosophick Accounts of Things. What he mentions under the Name of *Petrified Rushes* we have also received from the same Place, under the same Name, and find to be a fossil Coral of the slender and cylindrick Kind, formed in Clusters, and known by the Name of *Tubularia* among the Writers on these Subjects. His *petrified Clay*, if the same Substance we have received from that Place under that Name, is *Ludus Helmontii*. As to his *petrified Sand*, it is not easy on this Side the Water to make out what he

he means by it, Sand being naturally Stone, and as such incapable of Petrification.

His Observation of the corroding and burning Quality of Lime-Stone destroying the Wood, and so making Way for Petrification, we are afraid is somewhat like Mr. *Baker's* Account of Brandy's killing a Cat by rarifying the Air in her Stomach: We cannot be of Opinion that Lime-Stone possesses any thing of this corroding or burning Quality before it has been burnt.

He observes, that he could neither reduce the *Lough Neagh* Petrifications to Lime, nor run them into Glass: But his failing in the last Attempt is rather his Fault than the Stone's; all Stones, whether in their natural Form, or lodged in Animal or Vegetable Substances, if of the sparry Kind, will burn to Lime; and if of the Crystalline Sort, will run to Glass.

The *Lough Neagh* Petrifications are of the crystalline Kind, and therefore cannot be burnt to Lime, but after the Woody Part is burnt away, they may be run into Glass, either by the Addition of a fixed Alkali, or of red Lead.

That Springs running thro' Mountains, in which there are Veins of Ore, will, in their Passage, take up saline and metallick Matter, we agree with Mr. *Simon*; what he means by *unctuous* we do not so well understand; neither can we pretend to enter into his System, that the lodging these *metalline* and *saline* Particles in Wood, will turn it into Stone; we are rather apt to believe it would make it saline and metallick: In regard to this, and the petrified *Sand*, and some other Expressions of this Turn, we are to consider in Palliation of them, that they were written in *Ireland*.

As to his Doctrine, of petrifying Vapours and Exhalations arising out of the Depths of the Earth, and petrifying the Substances they meet with in their Way, we are ready to acknowledge that it is very pretty, but we cannot allow that this is the real Origin of all petrified Wood found in Sand and Earth, unless it can be proved that these Vapours can transport the Wood itself five or six thousand Miles first. If we must call in the Assistance of an universal Deluge, to have brought the Subject to the petrifying Place, we may as well allow it to have done the Office of petrifying it also, since nothing can have been so well qualified for that Purpose as a Fluid impregnated, as the Water of that Deluge evidently was, with the Matter of Stone of the hardest Kinds.

Mr. *Simon* thinks it impossible that these Stones should have been brought from six or eight Miles Distance, to the Lake; but here is a Power able to have brought them as many thousand. He supposes that they are of a mineral Nature, because they will not ferment with Acids, and that they contain Salts, which prevent their burning into Lime, but this is very miserable Philosophising, since their having Crystal for their Basis is a sufficient Reason why they should not ferment with Acids, and Salts are too easily calcineable themselves to prevent any Thing else from calcining. Such is our Opinion of the Paper of a Gentleman for whom we have a very sincere Friendship, and whom we could have wished to have seen out of the List of societarian Writers; but Partiality is inconsistent with the Intent of this Work, and we have that good Opinion of Mr. *Simon*, that we are persuaded he will be glad to be set right, tho' at the Expence of the Credit of some of his Opinions.

The Society would doubtless have been ready enough to receive and countenance such a System as this curious one; but if there could have been any Danger of that, the Success is in a Manner insured, by a recommendatory Letter of the Bishop of *Cloyne*, the Author of the Dissertations on Tar-Water, and on the Non-existence of Matter. This Gentleman's Opinions have long run counter to those of other People, in many Particulars, but they have the ill Luck to fall in with those of the *Royal Society* here: Bold, as it may seem in us, we shall not, however, disclaim our Censure of this Paper, because of either the Society's or his approving it; but to set the Matter in a fair Light shall examine the Reasons his Lordship gives for his doing so.

His Lordship sets out with telling us, that he had a thousand other Things to do, and that the Subject was much out of his Way: These are two very substantial Reasons why he should not have written about it at all; but we cannot allow them of any Force in the giving Credit to what he has chosen to write in spite of them.

He says, the Author seems to put it out of Doubt, that there is a petrifying Quality both in the Lake, and in the Earth about it. This may seem to be the Case to his Lordship, but we are apt to believe it does not seem so to any one who has any Sort of Acquaintance with the Subject. His Lordship approves his Doctrine of the Places where Springs ouze up from the Bottom of the Lake, as the only ones where this petrifying Power resides: He does not wonder, he says, how People should have missed of these particular Spots, in their Experiments, but he

he seems not to see that he ought to wonder, that such vast Numbers of Pieces of Wood as are found petrified in the Lake, should have been carried so very luckily to these particular Places, and retained there till they were petrified, by the Water ouzing up in them. The Place where a Spring rises in a Body of Water is certainly the very last Place in it where Pieces of Wood will lie still and quiet to receive it Effects.

His Lordship mentions the System established by some Authors, that Stones are organized Vegetables, and are produced from Seed; but he serves this, as we do the Papers of the Philosophical Transactions, he brings it in only with Intent to overthrow it; he establishes against it his own System, that *Stones are Vegetables unorganized*. We are apt to suspect that this, notwithstanding it comes from so great a Man as the Bishop of *Cloyne*, is a Sort of *Hibernian* Proposition; all the Authors who have written on Vegetables, have described them to be organized Bodies, containing various Vessels replete with Juices of different Kinds, and taking up the Matter that serves for their Growth and Accretion from some other Body, by means of Roots: If this be allowed a fair Definition of a Vegetable, what is this unorganized organized Body of his Lordship's? He gives an Instance of it in common Crystal, but this unhappily contradicts another Part of the Definition, beside this Matter of the Organization; for tho' fixed by its Base to some solid Matter, it does not receive its Encrease from that, but from Matter added to its opposite End or Point, either from Water or from Vapour in which it was before suspended.

His Lordship observes, that other Vegetables grow by attracting a Solution of Salt into their Tubes: This is not true, but if it was, what right have Stones to be called Vegetables, while his Lordship's self does not pretend that they have any such Tubes, or any such Attraction, but are formed by the very Accretion of their constituent Matter.

His Lordship adds, that *the Air is in many Places impregnated with such Salts*: In proof of this he observes, 1. That he has seen Pillars of Stone corroded and consumed by the Air in *Sicily*. 2. That he has elsewhere seen Marble corroded by the Air in the same Manner; and thirdly, that it is common to see the softer Stones corroded to pieces; and mouldering away by the mere Effects of the Air in the same Manner.

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We are as ready as his Lordship to allow these Facts, but we do not know how it is, but living on this Side the Water, we are inclined to differ strangely in the Conclusion drawn from them. We are convinced by them, that the Air is in many Places impregnated with such Salt as will destroy Stone, but we cannot make out what his Lordship meant to prove by them, that is, that the Air is impregnated with such Salts as will make Stone. His Lordship seems to imagine, that the Air in this Case takes up the Particles of Stone separated from the rest, but this is not the Case, they moulder away, and fall down in Form of Dust. His Lordship observes farther, that Air may become saturated with Salts in the Earth, and may then petrify Wood as it ascends toward the Surface: We are unluckily of Opinion, as to this, that Salt and Stone are not the same Thing; and consequently that the Air's impregnating Wood with Salt would not petrify it. He observes farther, that the insinuating of such Salts into the Wood seems confirmed by Mr. *Simon's* having observed some hexagonal Crystals in the Woody Part: This may seem to prove to his Lordship that there was Salt in the Wood, but to us it only proves that there was Crystal there, since these hexagonal Crystals are as much Crystal as the kerry Stone of the same Kingdom. That their Presence proves, that the Wood contains Salt, does not appear to us, unless Salt and Crystal are the same Thing, which is a Concession we are not at present in a Humour to make his Lordship.

His Lordship farther observes, that a petrifying Quality shews itself in all Parts of the Globe; in Water, in Sands, and in Earth: But this is an Assertion without Proof, and is founded only, on there being petrified Substances found in Water; which is no better an Evidence than that Houses produce Tables and Chairs, because we frequently find them there: He adds, that even Animal Bodies are not exempt from the same Law, and that a Child has been found petrified in its Mother's Womb. When his Lordship will give us Proof of this, we will readily allow him all the rest; but we are apt to be of Opinion, that his Lordship is the only Person, in the Character of a Philosopher, who ever believed it (the Members of the *Royal Society* always excepted.)

He observes, that Grottos, Lakes, Springs, and Rivers, are in many Parts remarkable for the same Quality. His Lordship is very good at a round Assertion, but we do not at present recollect so much as one of all these numerous Places where Wood is turned to Stone at this Time:

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There are many indeed whose Waters contain a large Quantity of Spar, and will deposit it in Crusts upon the Surfaces of Sticks and other Things that fall into them, but the Wood is not petrified by any of all these. His Lordship, we hope, will enter into the Distinction between Incrustation and Petrification; and if any thing more than the former is the Effect of any Spring, Lake, or River, known to his Lordship, we shall allow some Weight in the Argument. His Lordship is somewhat unlucky in his Instances of this Quality of Petrification; besides the petrified Child, just mentioned, he refers us to Coral and Amber, the one of them as far from a Petrification as the other, the former a Vegetable, the latter a Native Fossil, a Bitumen of the solid Kind in its natural Form.

CHAP. II.

An Essay on the Formation of Pebbles.

THIS is of the Number of those truly Societarian Dissertations, in which the Author forgets the Subject he set out upon, and never says a Word more of it than what we meet with in the Title. It stands in the four hundred and eighty-third Number of the Philosophical Transactions, and is written by the immortal Author of the Dissertation on Stittlebacks, and communicated to the Society by no less a Man, than the Discoverer of what the Society took to be the *Plantula Seminalis* in the Seed of the *Gramen Tremulum*.

It would not be very unreasonable to expect from what the Author tells us is the Business of his Treatise, something on the Manner in which these common Stones have been constructed, but the ingenious Mr. *Arderon* does not seem to remember that he intended any such Thing: He makes it his principal Business to treat of the breaking of Pebbles, instead of the making of them; and as to this, all that he tells us is, that they often are broken, we may inform ourselves how they come so as well as we can. The great Discovery he has made is, that there are found broken Pebbles in gravel Pits, the Pieces of some of which lie near together, those of others at a greater Distance, and that of some only one Piece is found in the Place; in consequence of which it seems, that they were broken elsewhere, and a Part of the Pieces

left

left behind, or else that *the Pieces broken from them have been since carried away*: This last is a Suspicion worthy a Member of the *Royal Society*. He concludes his Observations on these broken Pebbles with a very elaborate Argument, serving to prove, that they were not created in that State. This last Business seems about of a Piece with a Treatise commemorated in the *Acta Eruditorum* of a grave German, who spent four hundred and eighty odd Pages, to prove that a fossil Thigh-Bone of an Elephant was not created alone in the Stone Quarry in which it was found, but had once been a Part of an entire Animal.

What is it then, upon the whole, that this Gentleman honours the Society with a Communication of? why, that there are broken Pebbles found in Pits, and that they were not created in that broken State: A most amazing Discovery, and truly worthy its Author and its Hearers! Would it not have been as well to have added, if not according to the Promise in the Title, how these Bodies were formed, at least how it was that they were broken: but as he has chosen to omit this, it may not be foreign to our Intent in this Work to add both.

A first Principle to be advanced toward the explaining the Formation of Pebbles, is, that they are composed of a Matter once sustained in a Fluid. This is sufficiently evinced by mere Inspection, the regular Disposition of the Coats they are composed of, being such as could have its Origin from nothing but the Pressure of an ambient Fluid on every Part equally.

The Matter of which Pebbles are composed is Crystal rendered opaque by an Admixture of Earth, and coloured by the same Matter. This debased Crystal once floated in a Fluid, and was of various Colours and Degrees of Purity, according to the Nature and Quantity of the earthy Matter in it: When from an Evaporation of the superfluous Humidity or from some other Principle of equal Force, the suspended solid Matter began to get together, and form visible *Moleculæ*. Its first Concretions appear to have been into irregularly figured Masses of small Size, round which larger Quantities of Matter, of the same, or nearly the same Kind afterwards concreted; and, finally, after the Addition of a Number of Coats of this Kind, the coarser Matter still left in the ambient Fluid, found an external Crust or Coat covering all the rest. All this is evident, from the breaking a common Pebble of the crusted Kind, we find in its Center the small Mass formed by the first Concretion just mentioned, and round this we find other Matter disposed in Crusts, all of the same

same debased crystalline Kind, but of different Colours, according to the Nature of the debasing Earth; till a coarser Matter forms an external Coat and surrounds the whole.

Such has evidently been the Origin of Pebbles in general; but we meet with some indeed that are Exceptions to it, some that have no central Nucleus, but are either of one single Colour, or of several Colours less regularly arranged. These have all been the Effect of single Concretions, all formed at once, as the Nucleus's just mentioned were; in the first, the component Matter has been all of one Kind; in the latter, Matter of several Kinds has concreted together, and has been blended just as the Motion of the Fluid it was formed in disposed it.

Such has, unquestionably, been the Formation of Pebbles. It remains to enquire into the Manner in which many of them have been broken. We account for them as Concretions formed in a Fluid; that Fluid afterwards put in Motion by Winds, Currents, or whatever other Cause, would naturally roll away vast Quantities of these little roundish Bodies along with it; just as Pebbles at this time are, in Inundations, rolled along the Bottom of Rivers: In their Motion, they could not but strike often against one another, and at the Cessation of that Motion, they must needs have fallen upon and recoiled against one another in a much more forceable Manner than during their rolling on. The finding Pebbles in such vast Congeries in the Earth, and the Disposition and Arrangement of those Congeries prove, beyond a Doubt, their having been once carried along by Water; and when this is granted, it will appear very plainly, that of those broken by accidental Blows against one another in their State of Motion, the Pieces will not be found together; and of those broken by their clashing together at the Shock of a sudden Stop, the Pieces will necessarily be found either together or very near one another.

Mr. *Arderon* observes, that among the Fragments of Pebbles, some have sharp Edges and pointed Corners, as if fresh broken, others have blunted Edges and rounded Ends, as if altered after the Breaking, by rolling about among other hard Bodies. This, like all the rest that he has said, might as well have come from a Gravel-digger, as from a Member of the *Royal Society*, for there is no Reason alledged for it by the Author. It is evident, however, according to the System just advanced, that the Pebbles broken by the Shock of Stopping at once where they have ever since remained, must give us Fragments with sharp Edges and

Corners, as there has nothing happened since to alter them ; and that those broken in their Passage, and rolled about for a long Time afterwards, naturally afford Fragments with battered or blunted Terminations.

To this no Account of the Formation and Breaking of Pebbles, the Author adds some Observations on the Strata, and Matters contained in them, which will be a lasting Honour to the Society, as well as to himself : He says there are found among them Fragments of *Marble*, *Sand-Stone*, and *Gypsum* of various Kinds, most of which have obtained the Hardness of Pebbles, as it seems to him, *by lying among them*.

To this it is to be answered, that there is no such Thing as Marble or Gypsum ever found in Gravel-Pits, nor indeed any Fragments of what it is natural to suppose he means by the Word *Sand-Stone* ; that, however, is so vague a Term, that there is no arguing about it. We have seen, with his worthy Patron Mr. *Baker*, many of his Marbles, as he calls them, and have convinced him, as far as such a Man is capable of Conviction, that they are not, nor ever were Marbles ; nor will it be more difficult to do the same by his Gypsums. Mr. *Arderon*, however, is not the only Man who has fallen into this Error, as to the Marbles, tho' that of the petrified Gypsum he may pretty safely claim to himself. The *English* Jaspers are, in general, but coarse ones ; they are found in our Gravel Pits, and many of them have some Resemblance of Marble, particularly a black and white Kind, which is extremely frequent, and is probably the very Substance which Mr. *Arderon* took for Marble. It is found in small Masses, without any external Coat or Crust, and has the white Veins moderately large ; the black is the Ground ; this is of a very considerable Hardness, and if it ever had been Marble must indeed have been greatly altered since. There is, however, no Ground for supposing it any thing of the Marble Kind, except from some faint Resemblance in Colour. All the Marbles, properly so called, are composed of Spar ; they ferment with Acids, and are dissolved by them ; and they very readily calcine into Lime. On the contrary, this Stone, like all the other Jaspers, has Crystal for its Basis ; it does not at all ferment with Acids ; it does not calcine, but runs into Glass, in a strong Fire ; and when struck against a Steel, it gives Fire in the Manner of a Flint, which nothing of the Marble Kind can do.

We are to add also to this, an Observation, which if Mr. *Arderon* could have had any Idea of, would have prevented all this Error, which is, that Marble is not capable of receiving this additional Hardness ;
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absolute Petrification can only take Place in Substances whose Texture is to be broken by Water ; in other Bodies said to be petrified, the stony Matter only fills up the Pores between the Particles of the Body, whose whole Substance yet remains unaltered, only that a different Matter is introduced among it ; this would have been the Case, in regard to these Masses; if they ever had been Marble; their marbly Matter would have remained, and tho' altered in Hardness by the Addition of a harder Matter, they would still have been in Part soluble in Acids, and in Part calcinable into Lime, which is not the Case with any of them ever yet tried.

As to Pieces of Gypsum, or Plaister-Stone, they are found in Gravel-Pits in many Places, but they are always entire Gypsum, still unaltered in any respect ; so that either Mr. Arderon did not examine the Hardness of those Pieces he met with, or else he took some other Things for Gypsums, which would not be wonderful in a Member of a Society, of which, others have taken Belemnites for fossil Radishes, and *Ludus Helmontii* for petrified Sturgeon; and who, till ourselves laughed them out of the Error, kept them under those Names in their Collections. The last of these Bodies we ought not indeed to mention in this Place, without doing the proper Honour to this very Mr. Arderon, who, in one of his immortal Papers, preserved in these Transactions, describes a Piece of it under the Name of a Fossil, more curious than all the rest ; which had been cracked, and had the Salts of Water petrified in the Crevices ; and which, tho' he acknowledges that it has a great Resemblance to a Honey-Comb, yet, he assures us, he originally took for the Bones of the Head of a great Fish: And tho' he acknowledges also, that he thinks there is something in it that answers to the Description of the *Ludus Helmontii*, yet he seems too sensible of the great Honour derived to him from his former Conjecture to be brought to omit printing it.

CHAP. V.

Of the Disposition of the Strata of the Earth.

WOODWARD, and a set of Triflers like himself, have advanced some remarkable Things indeed in regard to the Disposition of the Strata of this Terraqueous Globe; but Mr. *Arderon*, conscious of the Uncertainty and Imperfection of Accounts taken from general Observations, gives us, in the four hundred and eighty-third Number of the Philosophical Transactions, his System, from such, as he assures us, he had made only in his own County.

The amazing Skill of the Creator of all Things, he says, has laid at top of all, Vegetable Mould, composed of various Substances, proper to imbibe and conduct Moisture to the Roots of Trees and Plants; Sands and Pebbles, he says, are laid under this, to carry off the redundant Moisture; and, that this may not run away too far, thin Strata of Clay are placed between to stop it; and, finally, lest these thin Beds of Clay should give way, they are supported by Crusts of a harder and ferruginous Substance.

This is much such a sort of Panegyrick on Almighty Wisdom, as it would be (to descend to ourselves) to celebrate a Mathematician for finding out that two and three make five. If the Perfection of Wisdom is seen in this Sort of Structure, in the superficial Parts of the Earth, what is the Case in the Millions of Places where this is not observed? We are apt to believe, that other Counties of *England* are as fruitful, and as well suited to all the Necessities of the Inhabitants as *Norfolk*, and yet this Distribution does not run thro' them all. If this Structure of the Earth be necessary for its Fertility, what becomes of all those Tracts of Land in which there is no Iron Stone at all; of some of the most fruitful Spots we know of, in which there is no more than this simple Structure of Parts, a Vegetable Mould at Top, under that a Foot or two of Gravel, and under that Clay to an unknown Depth? What we would inculcate from this short Observation, is, that People should understand Things before they praise them.

CHAP. VI.

Of the Nature of Stone.

WE have been favoured with a considerable Number of Treatises on the Formation of Stone before the Period of the Observation that gives rise to this Article. It has been a Subject on which more than one Author has lost some Reputation. *Tournefort*, a Man of high Rank in Botany, has made himself immortally ridiculous by it; and some others, that shall be nameless at present, have written with much the same Success about it. The present Dissertation, which is a very short one, but considerably rich in Matter for our Purpose, the World owes to the very eminent the Lord Bishop of *Cloyne*; it stands in the four hundred and eighty-first Number of the Philosophical Transactions, and is made a Sort of Sequel to some Observations on Mr. *Simon's* Account of the *Lough-Neagh* Petrifications, already commemorated with proper Respect.

The Doctrine established in this Paper is the Fusibility of Stone; his Lordship quarrels with the common Definition of *Stone*, which calls it a Fossil incapable of Fusion, and asserts that he has known Stone melted, and, when cold, become Stone again, such as it was before. We have, in another Place, given this noble Writer the due Praise for his Boldness in round Assertions; but this we should not have been able to judge properly of, had he not added the Instance in which he saw it effected; He tells us, that the Matter thrown out of the burning Mountains is melted Stone, which when it cools becomes Stone again, and is hewed, and employed in Building, at *Catanea*, and elsewhere in the neighbouring Places, being, as he tells us, a hard grey Stone. If to be hewed, and employed in Building, makes a Thing a Stone, we agree with his Lordship that the Assertion is made out: But unluckily, other hard Substances may be used for these Purposes; and this very Matter proves to be of that Number; for, on Examination, it does not appear that it either is, or ever was Stone, but a Mixture of metalline and sulphurous Matter, sometimes, indeed, with stony Matter among it, but when it is so, with that always unaltered farther than as
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by Calcination. Nothing is indeed more true than the Article of Infusibility in the Definition of Stones: They are indeed incapable of Fusion, as Stone, and whenever urged so far by the Violence of Fire alone, as well as by the Addition of other Materials, they do not concrete when cold into Stone again, but into Glass.

His Lordship observes, that from the Fusion and Coalescence of this Matter thrown out of the burning Mountains, it seems not impossible for Stone to be cast and run into Vases, Statues and Relievos; but unluckily, this depends on that Matter's being Stone, which is not a Fact: As to what he farther offers, in regard to the mixing Salts and Minerals with Stone to promote its Fusion, there is nothing more certain, than that it will assist it, but then it will run them, not into Stone again, but into absolute Glass; Red Lead or Salt of Tartar will serve as Instances of the Minerals and Salts to be used on this Occasion, and will never fail of their Effect. There wanted but one Thing to render this Paper perfect, which was, the instancing in it the Fusile Marble, as it is called, of which the Pillars of some of our Gothick Buildings are composed, which are so extremely slender and long, that People have supposed they could not be hewn, but must have been cast; Mr. *Simon* has stood his Lordship's Friend so far, as to call this in; he says in a Note, that, to confirm what the Bishop says, he remembers that he was shewn two Pillars in a Church in *France*, of sixty Feet high, said to be all of a Piece, and to have been run. Our own Gothick Cathedrals furnish abundant Instances of such Pillars said to have been run too: But it is no more than saying so; these Pillars are of Marble; and it is an amazing Thing that the People, who have ventured to assert this of them in their Works, have not considered, that Marble, instead of melting, calcines to Lime in a very small Degree of Heat. Most of these Pillars in our Churches are made also of a Marble full of Sea-Shells petrified, as many of our *English* Marbles are, what is it supposed must have become of these while the Marble was melted? and how happens it that they did not sink all to the Bottom, or swim all on the Top of the melted Mass, or blend themselves equally in every Part of it as they have done. This Art of casting Marble has been regretted by many, as one of the lost Secrets of the Antients; we are apt to believe that every reasonable Man, after these Hints, will set it about upon a footing with that of making Glass malleable.

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It is with some Regret that we have been obliged to treat the Character of so great and worthy a Man as the Bishop of *Cloyne*, in the same ludicrous Manner as those of the generality of the Members of the *Royal Society*. We wish very heartily he had kept out of our Way; but as laughing at the Errors of the Papers of the Philosophical Transactions is our Business in this Work, we could no more pass over so egregious a one as this, than we could treat it in a more serious Manner.

C H A P. VIII.

The Way in which Nature makes Crystal.

THE Opinion of the first philosophick Ages about Crystal was, that it was Ice of a more than ordinary Hardness, and that it was formed, like other Ice, of Water; but of Water that had been frozen for a much longer Time. In vain is it that the Authors of more improved Ages have bantered this System out of Credit; we see it revived again in the Philosophical Transactions.

How much Honour does the *Royal Society* of *London* deserve, for its patronizing these Doctrines of Antiquity: A Parcel of unlucky troublesome People, have of late quarrelled with the Systems of Ages before, and, but for the *Royal Society*, such is the Fondness that Men have for every thing that is new, they would, in all Probability, have overthrown them forever: Here, however, we have Champions who stand up in the Cause of every Error, that the Absurdity of Man has ever invented; not only the Formation of Crystal by Freezing is adopted by them in the memorable Paper that is the Subject of our present Consideration, but the Doctrine of equivocal Generation, of Sympathy and Antipathy, of the Force of the Mother's Imagination upon the Foetus, and a hundred other like ones, after all the Contempt that has been thrown upon them by the little Philosophers of an Age or two before, have the Honour to be received and countenanced there, nay, to be supported by Instances and Facts recorded, not unfrequently, with the Attestations of the Minister and Church-Wardens of the Parish: But of these in their proper Places. We could not deny ourselves the Pleasure of bestowing this
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general and just Encomium on the Body whose Works we are animadverting upon, when treating of so strong an Instance as this is, how well they deserve it.

The Account of the Formation of Crystal stands in the forty-ninth Number of their Transactions, and has for its Author *Muraltus*. This Gentleman had been in *Switzerland*, a Place where there is much Crystal, and much Ice also, found; a very sufficient Proof for a Member of the *Royal Society*, that they were both formed in the same Manner. He tells us, that the Mountains in that Part of the World, are, many of them, always covered with Snow, which melting by the Summer Heat, and freezing again in the succeeding Cold, becomes Ice, and that this covered with fresh Beds of Snow falling on it again, freezes yet more and more strongly, till at length it becomes Crystal, as hard and transparent as any Crystal in the World: He tells us, that there are whole Mountains composed of this Sort of Crystal, which are perfectly hard, but which sometimes crack and burst with a prodigious Noise, leaving Crevices capable of swallowing Man and Horse.

General *Oglethorpe* tells an excellent Story of a Fellow, who having found some brown crystallized Spar in a Cave in *Georgia*, at a Time when People were all running mad after Mines there, brought some Specimens of it Home, and declared he had found a Mine of Sugar-Candy: He had observed that it was brown enough and hard enough and clear enough for Sugar-Candy, but till the General put him in Mind of it, it had never come into his Head to taste it. Our Author *Muraltus* we find discovered as many Proofs that Ice was Crystal, as the *Georgian* did that Spar was Sugar-Candy: But there is no Question but that the Ice of these Mountains is Ice still, and that if any body of the General's Turn had been at his Elbow, to have put him in Mind of trying whether a Piece of it would not melt in his Mouth, we should probably never have been favoured with his Account of the Formation of Crystal.

The Mountains covered with Ice have Cavities as well as other Mountains, and in those Cavities there are Crystals formed, as Crystals are every where else: Few People, however, except such as this Author, would have therefore concluded the Ice on the Outside to be the same Matter.

CHAP. V.

Of the Original of Fossil Shells.

SHELLS of several Kinds wholly resembling those of Sea-Fish, known in different Parts of the World, as well as some unknown ones, and with these the Teeth, Vetrebræ, and other Parts of Fishes, and other Inhabitants of the Sea, as well as of Land Animals, have been at all Times found buried at great Depths in the Earth, in Places wholly out of the Reach of the Sea, according to the present Structure of the Terraqueous Globe: It appeared by this, that the Sea, tho' now contained within its due Bounds by the great Word of him who said, *hitherto shalt thou go, and no farther, and here shall thy proud Waves be stayed*, has once extended itself over the whole Surface of the Earth; and as we have an Account of such a Catastrophe in the History of the universal Deluge, recorded in a Book, which, of all others, it is most our Interest to believe, it has been generally established as a certain Fact, that these Shells were left at the Places where they were now found, at the Time of that Inundation; and we have been proud of having met with so strong a Proof of so wonderful an Event.

Little Philosophers are generally no great Believers: The *Royal Society* contemned the Use of Arguments of this Kind, and its Members set themselves to Work to prove, that these pretended Remains of Sea-Animals buried at Land never were Parts of Sea-Animals at all. Mr. *Beaumont* convinced himself and the *Royal Society*, by Arguments well calcuted to serve such a Purpose, that the Remains of Star Fish, called *Entrochi*, and now found immersed in the hardest Marble, were not the Remains of any Sea Animal, or of any Production of another Place than that they are now in; he argues, that they are Plants growing in these subterraneous Places, and proves, as Dr. *Richard Roe* observes of the Societarian Proofs in general, as plain as that two and two make five, that they have made their Way thro' the solid Body of the Marble in their Growth as readily and easily, as the superterranean Plants do in the Air.

But this is little to the Discoveries made by Dr. *Griffin Hatley* in the Paper which is immediately the Subject of our present Animadversions,
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sions, and which stands in the hundred and fifty-fifth Number of the Transactions.

This very philosophick Writer, being at *Hunton* in *Kent*, found there, at a great Depth in a Marle Pit, a great Number of *Conchitæ*, resembling Sea-Fish of the testaceous Kind. Some of them, he tells us, were of the turbinated, others of the bivalve Kind; they were all, he says, perfectly formed, and differed in nothing one from another, when of the same Species, except that some of them were cracked, or injured by Pressure. And he adds, that they made an Effervescence with Vinegar.

This is the Account the Doctor gives of the *Conchitæ* he found in this Place; and one would think any body would have inferred from the Whole, that Bodies, having the Shape, Colour, and all the Characters and Qualities of Shells, were really Shells, by some Accident buried in the Place where he found them; such, one would think, would be the Conclusion formed by any rational Creature on making such an Observation; but the Members of the *Royal Society* are famous for reasoning wrong upon right Principles; a Character that refers them to a Set of Men I shall not name at present. The Doctor, who writes his Dissertation on them, is a true Societarian every Inch of him; he revises the Whole, and declares upon it, that the Bodies he had found were not Shells, but were Productions of the Place where they then lay. When a Man has established a false Theory, he never is long to seek for Arguments of the same Kind to support it.

The Doctor first observes, that these Shells, tho' very like some Sea Shells in Figure, Texture, and Qualities, yet were *thinner* than any real Shells. 2. That many of the Bivalve Kinds, appeared to be *in fieri*, not in regard to their Shape indeed, for that he allows to be perfect in them all, but in respect of their *Hardness*; in regard to which he observed, he says, some in all the States of their Progress to Perfection, and could make them out from *the first Rudiments* to the perfect State and Hardness of the rest. This is the Doctor's unanswerable Argument against their being, as Fools had supposed them, the Spoils of Animals. 3. That the Bivalves are often imperfect, *one single Valve only* being found, not the two which make the compleat Shell.

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These are the Arguments against the Conchitæ being real Shells ; and from these the Author advances to propose his Opinion, as to what they truly are. He imagines them to be real animal Productions, tho' not brought from elsewhere, or the real Spoils or Exuviae of Animal Bodies. His System is, that all Bodies, animal and vegetable, as well as mineral, owe their Figure to Salts, and that if after they are dead or withered, they are cast upon the Surface of the Earth, the Rain falling upon them dissolves their Salts, and washing them down with it into the Earth, they there concrete again into their own Forms, and afford Bodies wholly like those they originally belonged to.

This we dare propose to the World as a System as truly unphilosophical as ever appeared in the Philosophical Transactions : It is, indeed, so extensive in its Consequences, that we are apt to believe the Author himself hardly saw to the End of them. Allow it but for a Truth, and it not only Accounts for Shells and Teeth, and all the other animal Remains, washed into the Earth in their Salts, if you can contrive to find the Way that they got above Ground over the Place, where they are now buried, but it excellently explains that strange Phænomena of Fern Leaves found in the Coal Slates : It makes out the Possibility also of those figured Fossils mentioned in another of these Chapters containing the Petrifications, (as they were erroneously called by those who found them) of Spiders, Caterpillars, and Bees, but gives us also great Hope of finding fossil Lions, Tygers, and Elephants, since these Creatures lying upon the Surface of the Earth when dead, as well as Cockle Shells, and indeed somewhat more naturally, may have their Salts washed into the Earth by the supervening Rains, and those Salts may concrete again in the midst of Earth, or of hard Rocks, into the perfect Forms of Lions and Tygers again, as easily as the Ashes of a Plant into the Plant again, under a Glass in the famous chymical Operation. What Reasonings ! and what Foundations for them !

The Doctor observes, that some of the Shells he found under Ground were thinner than any in a recent State. We would fain teach these Gentlemen the Modesty of not circumscribing Nature within the Bounds of their own scanty Knowledge : All that the Doctor had any Right to affirm in this Case was, that they were thinner than any recent Shells he knew ; but how many hundred Shells does the Sea produce, that such an Author as this assuredly did

not know? We may venture to affirm, that every Shell-Shop in *London* will produce Shells thinner than the thinnest he found among these. So that this Objection against their being the real Remains of Animals, is easily got over, by observing that they belonged only to a recent Species which the Doctor did know, and indeed we see very little Reason from his Account to suppose that he knew any; he does seem indeed to be able to distinguish between a Bivalve and Turbinate Shell, which is much for a Fellow of that Society, one of the most eminent Members of which, at the late Mr. *Jones's* Sale, took up a *Pecten*, and asked if that was not the *Buccinum* which such a Gentleman had been speaking of.

As to the second Argument advanced against Truth by this great Author, namely, that the *Conchitæ* he found were not all perfect, of their due Degree of Hardness, but that many of them were *in fieri*, and only exhibited the first Rudiments; one would be apt to imagine by it that he meant that they were in the same Sort of State that the Bear's Cubs are said to be before the Parent Animal licks them into Form; but by examining the Context, (the only Way for getting at the Meaning of Authors who either cannot or will not express themselves clearly) we find that he means by the second Assertion, no more than what he does by the first, namely, that some of the Shells were not so perfect, as he calls it, that is, were not so hard as others. We are to inform this Author that Hardness and Perfection in Fossil Shells is not the same Thing, but that there are in the Strata about *Woolwich*, Shells both of the Turbinate and Bivalve Kind so very soft, that most of them will fall to Pieces on touching, yet as perfect as the hardest in the World; indeed rather more so. This Author expressly tells us, that by his Account of the Shells *in fieri*, he does not speak in regard to their Shape, which is as perfect as in the others, but in regard to their Hardness and Thickness; we have his own Word for it, that this is all he means by the Expression, and the Society may have our Word for it, that in that Sense the Expression means nothing.

His grand Argument of all, which he reserves for the last, is, that he finds many single Valves without their Fellows, and that therefore they never were perfect, nor ever belonged to an Animal of the Shell-Fish Kind. It appears then impossible to this Author, that the two Shells of the Bivalve should be separated after it is dead, for we do not

suppose that even Dr. *Hatley* imagined these poor Creatures, if they had been real Shell-Fish, would have been buried alive there. Let the Gentlemen who are of his Opinion, look upon the Sea-Coasts any where, and see out of the Number of Shells of the Bivalve Kind thrown up there, how very few they find in Pairs; it would be of a Piece with Dr. *Hatley's* Reasoning, to conclude, that all the single Valves found there were formed by the Salts of others exhaled into the Air: As reasonable to the full as the Supposition that the single fossil Valves are formed in this Manner.

CHAP. I.

Of Ambergris.

PART THE ROYAL SOCIETY of London, wise, learned, and judicious, as it always was, was long ignorant of the true Nature of this precious Substance. It is not till the thirty-seventh Number of their Philosophical Transactions that we meet with any Account of it; and the Author of the Paper, in that Number, in which it is treated of, not content with the Praise of so eminent and egregious Discoverer as he had made, he indirectly thrusts it into the World with a cunning sneer at the name, for their long Ignorance and Error about the Subject of it. Before he tells them what it is, he assures them that it is not, as supposed, either the Semen or the Excrement of a Whale. It gives us solely to see a Man testing the very Body he belongs to: And however carefully avoided this turning Course may be, we are very well assured it cannot be levelled, as pretended by some, against the Ignorance of the World in general, but is evidently pointed at that of the Royal Society in particular. What the Semen of a Whale is, who in the Minutes can tell who ever heard of such a Thing? or who will ever be able to seek any Idea to it, till such a Work as we have now published. Publication of an Explanation of the Language of the Royal Society shall be published. It must be allowed, even by the most liberal of that great and learned Body, that no Man could but a Socinian and could

PART VIII. BOOK II.
ACCOUNTS of Particular FOSSIL
SUBSTANCES, published in the PHILO-
SOPHICAL TRANSACTIONS.

CHAP. I.

Of Ambergris.

THE *Royal Society* of *London*, wise, learned, and inquisitive, as it always was, was long ignorant of the true Nature of this precious Perfume. It is not till in the ninety-seventh Number of their Transactions that we meet with any Account of it; and the Author of the Paper, in that Number in which it is treated of, not content with the Praise of so eminent and egregious Discovery as he had made, ill-naturedly ushers it into the World with a cunning Sneer at the whole Body, for their long Ignorance and Error about the Subject of it: Before he tells them what it is, he assures them that it is not, as supposed, either the *Scum* or the Excrement of a Whale. It grates us sorely to see a Man reviling the very Body he belongs to: And however artfully worded this taunting Censure may be, we are very well assured it cannot be levelled, as pretended by some, against the Ignorance of the World in general, but is evidently pointed at that of the *Royal Society* in particular. What the *Scum* of a Whale is, who in the Universe can tell? who ever heard of such a Term? or who will ever be able to annex any Idea to it, till such a Work as we have already solicited the Publication of, an Explanation of the Language of the *Royal Society*, shall be published. It must be allowed, even by the bitterest Enemies of that great and learned Body, that no Mouth but a Societarian one could

could have used such a Phrase as *Scum of a Whale*, and we will venture to affirm, that tho' there have been People who have fantastically called *Affasœtida*, Devil's Dung, no body but the Members of the *Royal Society* ever took Ambergris for a Whale's Excrements.

After exploding Errors, the next thing is to establish Truth in their Place; the Author of this sharp Censure of the Society makes them amends for the Affront, by telling them what the Thing is, that they had so much mistaken the Origin of.

Ambergris, he informs them, is a Vegetable Resin, issuing out of the Root of a Tree: He was aware of the Objection that might be made to him, that Ambergris was only found at Sea, and about Sea Coasts; and he has provided a Salvo for it, that shews himself to be of the truly Philosophick Breed, notwithstanding his Severity to his Brethren: He tells us, that this Tree, at what Distance soever it grows from Sea, that is, if it grows in the Middle of the Continent, always shoots out its Roots towards the Sea, and they never cease growing till their Extremities are in the Water; it is then, and only then, he says that it ouzes out the Ambergris, and this, he informs us, is of so tough a Nature, that it adheres firmly to the Root itself, unless the Motion of the Sea, and *its Weight*, (which is so very great, that, he immediately tells us, it floats upon the Surface of the Water) separates it.

The last Business of the Author of a new Discovery is, the applying it to use: The Author of this important one is no more deficient in this than in the other Parts of his Office; he proposes the making Ambergris as cheap as Pitch or Rosin, by making Plantations of these Trees near the Sea, in Places where the Stream sets toward the Shore, the Consequence of which, he tells us, will be, that all the Ambergris produced by them will be thrown on Shore. We verily believe this last Assertion; but we cannot help lamenting the Loss of all the Advantage that might have been made of this noble Project, by the Author's forgetting to tell us what Tree this is.

The Society, not over famous for finding out the Defects of their own Performances, seemed not to have discovered this Deficiency in our Author's Memoir. They very modestly recant their former Errors, and publish this *authentick* and true Account of Ambergris, with the very Censure on themselves at the Head of it.

The World will not wonder, that, after this accurate, true, and scientific Account of Ambergris, the *Royal Society* remained perfectly
satisfied

satisfied with their Knowledge of it. Their Security on this Head lasted from the Time of their ninety-seventh Number in which it was published, till their three hundred and eighty-fifth. It would probably have lasted till this Time, had not a very eminent Gentleman, one Dr. *Boylston*, about that Time made a Discovery that entirely destroyed the Reputation of the former, and brought the Society into better Humour with themselves than they had been since the Time of that pretended Amendment of their original Error. This very faithful Relater of what he tells them he had seen with his own Eyes, brought them back very nearly to their original Opinion; if he does not prove it to be *the Excrements of the Whale*, he comes so near it as to make it *an Excrement* of the same Animal, tho' of another Kind.

He informs the World that Ambergris is an Animal Substance, originally moist, and secreted in a peculiar Bag placed near the genital Parts of the male Sperma Ceti Whale. He tells us, the Bag it is contained in has no visible Inlet or Outlet for it, and that it is sometimes found quite empty, yet entire.

The Account he gives of this Discovery refers it, like most other great ones, to Accident; he says, it was at first discovered by Chance, twenty Pound Weight of it being found on the cutting up of one of these Fishes; and that after this the Fishermen having been very cautious in searching all the Whales they killed, often found Quantities of it in them: He observes, that it has never been found in any other Species of Whale beside this, nor ever in the Females even of this Species.

However easy the Society had been during the long Interval between these two Papers, they were roused by this last, and become now busy enough about it. When a Blunder is once started among this great Body, there never want Members to push it farther. But one more Number of their Works was published before the often commemorated, and often to be commemorated Mr. *Dudley*, took up the Subject. We find him in the three hundred and eighty-seventh Number, adding to his most accurate and scientifick History of Whales, his Thoughts on this Whale Excrement, as he calls it: A Paper worthy such a Supplement! and a Supplement worthy such a Paper. In this memorable Piece he enters into the Origin of the great Dr. *Boylston's* Discovery; he will by no Means allow Chance or Accident the Honour of so glorious an Event, but is of Opinion, that the first Ambergris ever found in a Whale, was sought for there, and that what gave them the Hint for such a Search,

was

a Search was the finding Ambergris in its loose State on the Shores of the *Summer Islands*, and among the *Babamas*, where the dead Whales were frequently cast up, and their Carcasses broke up by the Waves.

After the Discovery was made, however, he tells us, that the Learned were divided as to what the Substance really was; some, he says, taking it to be the Semen of the Whale, as it was found only in the Male, and in him about the Testes; and others, the Excrements, from its being lodged near the Part at which they are voided; the Assertors of this last Opinion maintaining, as well as those of the first, that the Males only of these Whales carried this precious Perfume in them, seem to have taken it for granted, that the Female produced no Excrement at all.

It may be added by the bye, that the Bag in which the Ambergris was said to be contained, being agreed on all Hands to have neither Inlet nor Outlet, agreed equally well with the one or the other of these Opinions.

After thus discussing the Origin and Nature of Ambergris found in Whales, he comes to the Matter of Fact, that it really was found there. On this Occasion he calls in Mr. *Atkins*, who he tells us, had followed the Whale-Fishery many Years, and particularly was one of the first who caught the *Sperma Ceti* Whales, and discovered this precious Substance in them. His Account is, that the Ambergris is found in Balls of a roundish Figure, and various Size, in the Body of the Animal, lying loose in a large oval Bag, which he compares to a Smith's Pair of Bellows, and says, opens into the Penis. Here is a fair End of Dr. *Boylston's* Credit, who declared that the Bladder it was lodged in had neither Inlet or Outlet; but he goes on to tell us, that it has not only this Outlet, but has also an evident Inlet, by a Duct opening into its other End, and coming from the Kidneys. This Bag or Bladder he tells us, is always more or less filled with a deep Orange-coloured Liquor like Oil, but thinner, and smelling strongly of Ambergris. He adds, that the Balls are always made up of several Crusts or Coats, laid one over another like the Coats of an Onion, and that some of the outmost of these break off sometimes, and are found loose in Form of thin hollow Shells in the Bag, along with the great Stone. He tells us, there are sometimes found three or four of these Balls of Ambergris in the same Bag, but oftener only one, and much the ofteneft of all not that. For one that has any of these Balls in it there are two,

he says, that have nothing but this Orange-coloured Liquor in them ; and Mr. *Dudley* adds from another Hand, that the Whale never has any Ambergris in it till full grown. That nothing may be wanting to perfect this Account, the Author of it adds the Method in which he used to get the Ambergris out of the Whale, which was, by turning the Fish on its Back, fixing a Tackle to the Penis, cutting his Way round its Root into the Belly, and there finding the Duct that runs from the Kidneys, tying it up, cutting it off behind the Tying, and then pulling away the Penis with the Tackle, the Bag following it whole.

To this full and particular Account of the Situation of the Ambergris Bag, another of the Persons concerned in the Paper, Mr. *Prince* of *Boston*, adds, that by the Duct which runs from the Kidneys to this Bag, and by its opening into the Penis, he has made a most amazing Discovery, namely, that he verily believes this said Bag to be the urinary Bladder.

How unhappy a Circumstance is it, attending great Discoveries, that they destroy one another, at least it appears to be usually so in the Discoveries of the *Royal Society*. Dr. *Boylston*'s Honours for his Account of the Ambergris, had scarce sat easy upon him, before a newer Account comes forth and wipes them all off. What becomes of his blind Bag for the Reception of this precious Excrement, or of his Account of its Softness while in the Whale, now that Mr. *Atkins* declares it so hard, that the Pieces often scale off from it, and remain loose in the Bladder: Upon the whole, we are apt to suspect, that some Envy or Misunderstanding between Dr. *Boylston* and Mr. *Atkins* gave rise to the Account given by the latter ; we very shrewdly suspect many of the Particulars in the last Account, as of this Turn, and till we have met with some Ambergris, of the regular coated or crufted Kind that he describes, shall be apt to suspect that he never saw any, notwithstanding his making it so much more frequent than the Doctor does, who says it is not one Whale in a hundred that has any of it, while the other makes it about one in three of them that has.

Such were the Discoveries of the *Royal Society* of *London*, in regard to Ambergris ; and such, for any of their own Members, had the Account of it stood to this Time in their Transactions. The Ambergris is in reality no more an Excrement of Whale than it is an Exudation from the Root of a Tree ; nor is there any the least Truth in the Description either *Boylston* or *Atkins* gives of the Bladder in which

which it is said to be generated. As to *Boylston's* Account, it is evidently false in Fact; no such Bag peculiar to the Ambergris, and without Inlet or Outlet, being found in the Whale: And as to the other, he evidently describes the Urinary Bladder of the Whale; and what he describes, as found in it, are evidently the Urine of the Creature, and calculous Concretions in it of the same Kind with those in the human Bladder, and having no more Resemblance to Ambergris than Bezoar has to Amber. Upon the Credit of this, however, the ever to be honoured Mr. *Dudley* desires the *Royal Society* will ascribe to him the Honour of the Discovery of what that *Arcanum Naturæ*, called Ambergris, is: We do not know what Honour the Society will do him, but we cannot omit observing, that the Honour he really deserves, is that of a Man who did not know a Stone in the Bladder from a mineral Bitumen: But if any greater Honour had been due for the Paper, why was it to be paid to him? Mr. *Atkins* is the Person who made the amazing Discovery; Mr. *Dudley* was but to him, the *Baker* to an *Arderon*; the ignorant Introducer of an ignorant Paper of some body's else, to a Society, who were ignorant enough to do both of them Honour for it.

The Foreigner we hinted at, as giving the Society some better Information of the Nature of this Drug, is *Newman*, who, with truly *German* Indefatigability, has ransacked *Klobius* for all the Blunders heretofore established on the same Subject, and after proving by chymical Experiments, such as another of his Fraternity sometime before used, to prove that Cassada Bread was not made of Oister-Shells, that Ambergris is neither an Aerial Meteor, as *Olven* thought, nor yet the Dung of Birds, the Hives of Bees, the Fruit of a Tree, nor Camphire, nor Sperma Ceti, as *Averrhoes* and *Cardan* had established; he takes the Word of *Monardes*, *Johannes Faber*, *Henckel*, and *Hernandez*, together with four hundred Persons more of his Time, that it was really a Bitumen. Thus far he is unquestionably right, but there are certain other Circumstances, he is sufficiently deficient and erroneous in, to give his Paper a Title to the Place it holds in the Publications of this erring Society.

The true History of Ambergris is this: It is a fossil Substance of the inflammable Kind, a Bitumen originally soft like Honey, but hardening on being exposed to the Air, and washed about by the Waters. It ouzes out of the Earth, that forms the Bottom of the Sea, in this soft State; and

being naturally lighter than the Water, it is no sooner got loose from its Prison than it ascends to the Surface, where it becomes harder, and in Time concretes into a dry, opaque, and tolerable firm Substance, of a lax, incoherent and irregular Structure and uneven Surface, of an extremely fragrant Smell, soft and fatty like Sewet to the Touch, and of a paler or darker Colour, but always something between Grey and Black. Such is the Form in which we see it ; and the Size of these Masses is very various ; those of two, three, or four Ounces, are very common ; there are many larger in our Shops, and we have Histories of such as are of many Pounds. *Faber* quotes *Bolivar* for an Account of Pieces of a hundred thousand Pound Weight each ; and *Garcias ab Orta* tells us there are whole Islands of it, but these are probably of the Number of Histories of things that never existed. Pieces of more than a hundred have really been found, but these have been only a few from the very earliest Time in which the Drug was known.

As Ambergris is soft, while oozing out of the Earth, it cannot but pick up and receive into its Masses, a Multitude of small Bodies that lie in its Way at that Time ; as the Sea is the Place from whose Bottom it always issues, they must be Sea Productions that are thus embodied in it, and such they are. We have Accounts, indeed, of various strange Things met with in Lumps of it, from Authors fond of telling wonderful Stories, or busy upon establishing some peculiar System as to its History. Supposing Ambergris to be produced near the Shore, and thrown upon or against it while yet moist ; we may indeed account for many strange Things being embodied in it, perhaps for all that have been related to be found so ; but, to descend to more evident Facts : The Things in general found in it are all such as it might meet with at the Bottom of the Sea ; all that I have found in the Masses I have had Opportunities of examining, have been Fragments of Sea-Shells, little Scraps of Coral, Grains of Sand, and the Parts of some of the crustaceous Fishes. We find frequent Mention in Authors, of the Beaks of Birds found in it ; and some have gone so far as to ascertain the very Birds they belonged to, and tell us they were Parroquets ; *Newman* acknowledges this, and from his having actually seen some of these, he believes the Authors, who talk of other Parts of Birds being found there, and gives an Account of the Origin of Ambergris that may favour it. He tells us, that it is evidently exsudated out of the Earth, on the Sides of Hills, and thence rolls down into the Sea, where

where it is washed about by the Waves, and at last thrown on Shore. He does not, indeed, pretend any certain Knowledge of this as a Fact, but reasons from the supposed Consequences,

It may be asked, if Ambergris be thus produced in Hills, why is it never found in digging? why does it never stick by the Way instead of rolling clean down into the Sea? or why does it not sometimes ooze out of Hills not near the Sea, and so offer itself to us on Land? Nothing of this Sort happens, nor is there any other Foundation for this System of its being produced at Land, and thence carried into the Sea, beside the finding these Beaks in it; but a little farther Knowledge in Natural History would have informed these Writers, that the Beaks they find there, are not those of Parroquettes but of Calamaries, Parts of Animals Inhabitants of the Waters, not of the Air, and consequently, that they help to prove, instead of invalidating, its true History, which is, that it is produced in Form of a soft Bitumen at the Bottom of the Sea.

As to its having been found in Whales, there are too many Accounts of the Fact to leave room for the disbelieving it. That it was ever found in the urinary Bladder of that Animal, or in a peculiar Cystis or Bag, are Accounts equally absurd, and equally worthy the Place in which they stand; whatever has been found in them has certainly been in the Stomach or Intestines. The Whale is a Fish that feeds at random, frequently scuming the Surface of the Water of whatever Herbs it finds floating there for a long Way together, among these it may sometimes take in small Masses of Ambergris, and these being indigestible, if too large to get out by the common Passages, will be found in them. Upon the Whole, none of the Substances found in the Whales, by the Authors of the Papers printed in the Philosophical Transactions, were Ambergris, or any Thing like Ambergris: No very large Mass of Ambergris ever was or ever can be found in a Whale; and whatever is found there, is what the Whale has first swallowed, and can be only in the Stomach and Intestines.

CHAP.

C H A P. II.

A Dissertation on the Amianthus.

THAT there is such a natural Substance as a Fossil of a thready or filamentous Structure, capable of being wove into Cloth, and of such a Nature that it is not to be injured by Fire, the Antients seem to have known from the earliest Times we have any Account of ; the oldest Writers among them go so far as to talk of Napkins made of it, which were thrown into the Fire to be cleaned, by burning off the Dirt ; and of Sheets, in which they wrapped Bodies to be burnt, to prevent the Ashes of the Fewel from mixing with theirs : They called this Substance, Amianthus, Asbestus, and Linum Fossile. They were content with knowing it, and with understanding the Method of working it : We, who are of more enterprizing Genius's, have disregarded, and, in a great Measure, lost the Art of working it ; but the *Royal Society*, tho' above so low Regards as to render any Thing useful, or to meddle with Spinning and Weaving, have been at no small Pains to prove what it is.

There are several Papers on the Subject in the Philosophical Transactions, but the grand one, in which this Disquisition is carried to such a Height, as it never was or ever will be, probably, any where else, is in the hundred and seventy-second Number ; we are sorry to name its Author, who is no other than the learned and ingenious Dr. *Plot*, the Author of the natural Histories of some of our Counties. Every body knows with what Success this Author has written on other Occasions, but there is a Sort of Fatality, that when a Man becomes a Societarian Author, he writes like his Brethren. The Doctor, after giving sufficient Proof of great Reading, proceeds to quarrel with all the Authors before his Time for ranking this Substance among Stones, and calling it by the Name of a Stone ; he declares it to be a *Terra Lapidosa*, or *stony Earth* ; he adds, that it consists of *some Salt* and a *pure Earth*, coagulated in the *Winter's Cold*, and hardened by the *Summer's Heat*.

How

How ought every body that knows the Credit Dr. *Plot* acquired by some other of his Works, to wish he had never written this ; what an Account of a Thing for a Philosopher ! Not a Stone, but a stony Earth ! It is very evidently neither one nor the other has a Particle of either stony or earthy Nature in its Composition : It is a peculiar Fossil of its own Kind, as different, nay, much more different from both Stone and Earth, than they from one another ; why must it be supposed a Mixture of two different Substances, not any one of which has any one of its Properties ? and why might not the same great Power, that created those two different from one another, create another equally different from both ? As to the miserable System of its Formation, that it was coagulated by Cold, and hardened by Heat, we shall only observe, that Heat and Cold being Contraries, and Coagulation and Hardening being not so, the whole sounds very unphilosophical ; what Cold could coagulate, Heat would dissolve into a Fluid again, not coagulate and harden farther : But where is the Necessity of recurring either to Cold or Heat, to account for the Formation of this Fossil, any more than for that of others ; what is there so singular in the Formation of this, that it might not be formed as they were ? and what Particular in it that gives the least Hint for either Heat or Cold having been concerned in the occasioning it ?

We could almost wish to stop here, and leave the Paper half censured, but when we are engaged in this System of the Formation of this Fossil, not to contradict, is to assent. The Doctor has no sooner established the Necessity of a Salt in the Formation of the Amianthus than he will find out what Salt it is : If he had left us there, we might have supposed that he had only mistaken the Characters of Salts, and taken the Stone itself for one Kind of them : But he goes on to tell us, that tho' he did not know what Salt it was that entered the Composition of this remarkable Stone, others did : He quotes *John Hesselus*, for a Proof that it is Alum ; and particularly, Alum in that State in which the Antients call it *Alumen Liquidum*. This *John Hesselus* tells us, that this Fossil, while in the State of Alum, oozes out of the Earth in this its liquid Form, and is of a whitish or yellowish Colour, and smells like rotten Cheese. Accounts are not worth a Farthing Authors think, unless they are supported by ocular Testimony. He adds, that he found some of this liquid Alum near *Puteoli*, which he laid by among many other Things of the fossil Kind, and coming a while afterwards to

examine his Papers, he found his liquid Alum converted into Asbestus.

Every rational Man, we flatter ourselves, will conclude, that the whole of this wonderful Matter was no more than, that *John Heflus* having laid by several Things together, mistook his Parcels, and falling upon one, into which he had put Asbestus, and taking it for that he had put the liquid Alum in, he did not recollect that it might be an Error, but set down the Effect in the History of this most memorable Transformation: Dr. *Plot*, however, did not care to look upon the Account in this Light: He concludes it to have been a Fact, and gives the Rationale of the Process, telling us, that Asbestus was evidently found in *John Heflus's* Parcel, just as it is in the Earth, the Salt shooting itself into Threads, and the pure Earth mixing and uniting itself with them.

When a Man has got hold of a Prejudice it is amazing how far it will carry him: *John Heflus's* Account of the Asbestus being formed of Alum, appeared so rational to Dr. *Plot*, that he would needs reconcile all the Asbestus he was acquainted with to it: He had seen that which he declares to be not exsuded from the Earth but percolated thro' Rocks, yet he fancies he finds in it all the Marks of Alum: He is a little unlucky, indeed, in calling the Rocks it is lodged in flinty ones, but this is a Mistake he has been led into by another Author of no little Fame *Lloyd*, who has said the same Thing in the same Transactions. These Rocks are indeed of a Kind of serpentine Marble, and that of very considerable Beauty. The great Reason Dr. *Plot* gives for believing the *Anglesea* Asbestus formed of Alum like *John Heflus's*, is, that it is in some Places yellowish or Stone coloured, as that Author says his Alum was while liquid: A noble Reason indeed, such a one as we are apt to believe its Author would never have ventured to have given, if he had not been writing to the *Royal Society*.

One would wonder how the Opinion of a Connection in Nature between Asbestus and Alum came first to be imagined; that there is not the least Quality in Nature to give rise to such an Opinion, is obvious to every one who will enquire into the Nature of both, yet we find almost all the Authors who have written on the Subject, not only preaching up their near Relation to one another, but almost all of them confounding the Plumose Alum and the Asbestus together; nay, our Druggists at this Time, if they have any thing in their Shops under the Name of

Alumen plumosum, are sure to have Asbestus there for it. So old and so accurate a Writer as *Agricola* has the same Error; he tells us Asbestus is like Alum, and that from a Pungency that it has upon the Tongue, tho' without Astringency, it was called Alum, with the distinguishing Epithet *Plumeum*, to express its thready Texture, resembling in some Degree the Structure of a Feather. This might be a Reason, tho' but a very poor one, for some of the Asbestus being called plumeous or feathery; but the great Question is, how it came to be called Alum. What *Agricola* calls a Pungency on the Tongue in it, is not of the Nature of the Pungency of Salts, but is merely owing to its pointed Particles wounding the Tongue; this is a Character, however, not general, but peculiar to a few Species only, the Filaments of which are more than ordinary rigid.

That there is no real Resemblance between the two Bodies is certain: The Alum is a Salt, the Asbestus a Fossil of its own Kind, with no one Quality of a Salt in it; the Alum is soluble in Water, the Asbestus not; the Alum melts over a gentle Fire, the Asbestus remains unaltered in the fiercest Degree of it. There seems indeed to have been no Foundation for the confounding these two contrary Substances, but the Ignorance of People who had been used to see plumose Alum, and who afterwards meeting with the grey Kind of Amianthus, and seeing some Sort of external Resemblance in the thready Texture and grey Colour, supposed it the same Thing, received it into the Shops as such, and would have been the Occasion of some Mischief if it had not grown out of Use as a Medicine.

Dr. Plot, after giving his Opinion at large as to the Certainty of Asbestus being no other than Alum, proceeds to enquire into the Reason of its resisting the Action of the Fire in this remarkable Manner: He goes back as far as *Aristotle*, to prove that Fire separates Things of a different Nature, but not those which consist of homogeneous Particles; upon this Principle he concludes it is that Asbestus resists the Force of the Fire, for he says it is altogether homogenous, and nothing else but the pure Striæ of *liquid Alum*, and that therefore holding nothing heterogeneous among it, it cannot be possibly liable to any Injury from Fire: Not to mention the Doctor's Contradiction in this Place to himself in the beginning of the Paper, where he tells us the Asbestus is formed of the Striæ of Alum and pure Earth, let us consider whether pure Alum is qualified to answer the Test like the Asbestus or not: If the As-

bestus resisted the Fire merely as pure Alum, all pure Alum must resist it in the same Manner; but we are afraid that if any body will try pure Alum in the Fire, it will not be found to resist its Force in the same Manner.

It is no new Thing to find a Paper in the Philosophical Transactions, the latter End of which contradicts the Beginning; but it is surely wonderful that such a Man as Dr. Plot should deceive himself so egregiously, as to think a Substance was Alum, because it had Properties which it was impossible that Alum or any other Salt should have; and should carry it so far, as to argue for its having these very Properties in Quality of its being Alum.

We have observed in the Beginning of this Chapter, that there were some other Dissertations in the Philosophical Transactions on this Subject of Asbestus, we gave the Preference to this of Dr. Plot's as the most pompous by far: The others are only Facts related plainly, this contains Reasonings, such as they are, Quotations in Abundance, History, and a Profusion of Literature; it is indeed, above all the rest, qualified to answer the Purpose of these Animadversions, but the rest are not to be omitted; we shall name them in their Order, that we may trace out the Progress of Knowledge in the *Royal Society* in this, as in a Multitude of other Instances.

So early as in the seventy-second Number of the Transactions, we meet with an Account of Amianthus: The Author of this Paper tell us, that Amianthus, or Asbestus, is a thready or downy Stone, which he had found the Way to work into a Sort of thick Substance like Lamb-Skin when dressed, or into a thinner and tolerably white one like Paper; and that either of these thrown into the Fire, or even buried in burning Charcoal, suffered no Injury at all by it, but came out perfect and white as before. Here is a Paper written by a Man, who had found and worked upon Asbestus, and consequently had some Knowledge of it, which Knowledge he communicates to the *Royal Society*, and contents himself with that, advancing nothing farther. In this Paper every thing is evidently Truth.

The second Paper that we meet with on the Subject is at so considerable a Distance as in the hundred and sixty-sixth Number, its Author is Mr. Lloyd: This Gentleman had seen the Asbestus of *Anglesea*, and describes it, telling us, that it runs thro' a Crack of a Stone not unlike common Flint in Hardness and Colour. There are few People who

look into these Studies but have by this Time seen the *Anglesea* Asbestus in its Bed of Stone, as this Author calls it, and whoever has seen it will agree with us, that its Bed is not Flint, but serpentine Marble. As to what this Gentleman says farther, it seems only an Imitation of the Author's Attempts mentioned in the former Paper; he tells us that he had had Paper made of it, but that it was very coarse and apt to tear.

In this Paper there is no new Truth established, nothing advanced that the Author who wrote of it before had not said; nothing, in short, but a Proof that Mr. *Lloyd* knew less of it than that Author who is a Foreigner, and a very obvious Error about the Bed of Matter that it lay in, in the very Place where the Author saw it.

The third Paper on the Subject is at a considerable Distance of Time from this: It stands in the two hundred and seventy-third Number; its Author is Sig. *Ciampini*. The Knowledge of the Asbestus began to grow very low at this Time: This Gentleman, who mentions several Kinds which he had in his Possession, and, among the rest, tells us of one Sort which was composed of Scales or Lamina laid one over another like the Coats of an Onion, of a blackish Colour, and behind with white, black, and red. We may see by the Description how just an Idea this Author had of the Nature of the Subject he was treating of. Its Use was as much out of his Reach also as its Characteristics; he gives indeed a long, not to say tedious, Account of a Manner of spinning it, but it is to be done with so great an Admixture of other combustible Matters, that it is pretty evident, that tho' when it is thrown into the Fire and they are burnt away, the Asbestus will remain as the Author says, yet it is also evident, that the Asbestus cannot retain its Form of Cloth in that State: The Foreigner who gives the first Account of it in the Transactions, and who evidently knew more of it than any of those who wrote afterwards, tells us among other Things, of its excellent Use in the Wicks of Lamps: *Lloyd*, tho' he had lost much of the Use of it, known to the other, yet retained the Knowledge of this; but in this third Paper we find even that lost: Sig. *Ciampini* mentions with some Contempt the supposed Use of it for the Wicks of sepulchral Lamps, and from his own Experiments concludes it unfit for that Purpose, having always found the Wicks, made of it, go out, and not attract the Oil to keep up the Flame.

We meet with a great many Instances of this Kind of Reasoning in the Philosophical Transactions ; a Man hears of the Discovery of some considerable Person, he makes the Experiment, and it does not succeed, and he tells us he has proved the Falsity of his Author, while, in reality, all that he has proved is, that himself is not qualified for making Experiments.

The fourth Paper in the Transactions, on the Subject of Amianthus, is that of *Dr. Plot*, which we have already given an Account of: The candid Reader will not scruple to join with us, that there is more Absurdity and Error in that, than in any one of the former.

The fifth is in the three hundred and thirty-third Number, its Author is *Mr. Blair*. In this Paper we are told of Asbestus in the Form of a Stone, making up whole Strata, so soft, that it was easy to cut it into Shape, while digging it, with a Spade ; and so firm afterwards, that a very good Friend of the Author's built him a House of it.

The Author of this Paper very judiciously compares Asbestus to salt Beef, and tells us of a Substance like *Sanguis Draconis*, found among it, which he fancies would be useful in Dying ; we are apt to believe, that fossil *Sanguis Draconis* may be at least as proper for Dying as Asbestus for building Houses with : As to the digging it up with a Spade, and cutting it into Form in that Manner, it naturally puts one in Mind of the Account one of the greatest Lapidaries in Town used to give of the Pudding-Stone ; that in *Hertfordshire*, it was so soft, that he used to cut out Pieces of it, such as he liked, with a Trowel.

There are some other Papers on the Subject of the Asbestus, which containing nothing but what is in one or other of these, we shall, not chusing to be too long on one Subject, pass over.

The Progress of Knowledge in the Society on this Head cannot but be allowed, however, to be just what we have always declared it on the others, gradually declining from a little to none at all. It is evident, that the Author of the first Paper knew but little of the Subject, but what he knew he told us ; the second knew still less ; the third less than he ; the fourth is more learnedly absurd than any of the others, and that with less Knowledge of the Subject than any, except the fifth, whose Houses, salt Beef, and Dragons Blood, we flatter ourselves, will sufficiently convince the World that he knew nothing at all of it.

The Asbestus is truly of several Kinds, some long, some short in the Filaments, some very flexible, some perfectly rigid. It can be no Wonder that

that People who supposed all the Asbestus in the World to be one Thing, as is evidently the Case with the generality of those who have written of it, should give very different Accounts of their Success in working it, and that some should declare it capable of being wrought into any Thing, others fit for nothing at all. The Asbestus of *Anglesea* is very fine and flexible, but it is usually short; that Kind called in the Shops *Alumen Plumosum* is extremely rigid and friable, and is fit for nothing: This is the Kind most frequently met with, and it is highly probable, that they who have laughed at the fabulous Antients have made their Experiments with this Species.

C H A P. III.

An Account of a curious Echinites, the like of which was never seen before, preserved in any Musæum, or described by any Author.

THE Study of Fossils has become extremely fashionable within the two or three Years last past, and as every good Thing will be attended with some Inconveniencies, one of the Consequences of this has been People's writing upon it, who have had no Qualifications for it, who have read none of the Authors who have written on the Subject, nor have informed themselves at all of the general Processes of Nature in the Formation of the Bodies they write of. We cannot but admit the Author of this most pompous Dissertation, to the Honour of a very first Place among the Writers of this Class. The Title to it, which is perhaps one of the modestest in our whole Collection, we have borrowed from himself; it stands very nearly in the same Words in the third Line of the Dissertation, which appears so late as in the four hundred and eighty-second Number of the Transactions, and is written by Mr. *Baker*, on the Subject of this truly curious and pretty Specimen given him by the celebrated Mr. *Arderon*. The Specimen itself is an Echinites, Part formed of a coarse yellowish brown Pebble, and Part of a tolerably pure Crystal, formed into transverse Ridges and Furrows on the Surface. After boasting that he has never seen the like of it in any Musæum, nor met with a Description of it in any Author, he begs leave to observe that *the Shell of the Echinites is perfectly smooth internally having no rising*

Parts correspondent to these Cells or Cavities: And that consequently the Crystalline Part of this Echinites must owe its Form to the *natural shooting of the Crystal*, or else to some other Cause which *he does not know*.

We are extremely ready to allow Mr. *Baker*, that things may happen from Causes which he does not know, but we would wish him to pay so much Respect to the Society, which his Papers are read before, as not to write upon Subjects, in regard to which he is to make these Confessions. The very philosophick and ingenious Dr. *C. Mortimer* adds a Note on this Occasion, which is truly his own; in which he hints, that some Cells or Membranes belonging to the Body of the Fish, may have furnished this unknown Cause; but had either he known any thing of the Body of the Fish, or Mr. *Baker* of the Shell of it, we should have been robbed of this Occasion of doing Honour to two such notorious Gentlemen.

The Configuration of the Crystalline Part of the Echinites here described, is indeed wholly and entirely owing to the Shell of the Echinus it was formed in, and to explain this to Mr. *Baker*, we are to inform him, that the Inside of the Shell of that Species of Echinus in which this was formed is not *perfectly smooth*, tho' he presumes enough on the Ignorance of the Society, to venture, out of his own Ignorance; to pronounce so much: It is very certain that it has no rising Parts corresponding to the Cells in this Echinite; this happens to be a Truth, tho' he declares it at random; but tho' it has no rising Parts to form the Cavities, it has sinking Parts (to talk in his own philosophick Way) to form the Ridges. It has transverse Furrows exactly answering to every Ridge of this Crystal, which we are apt to believe, if Mr. *Baker* knew a little more of the Nature of these Casts in Shells, would serve to explain the Configuration of his Echinites to him, without having Recourse to a natural Shooting of Crystal, perfectly different from its natural Shooting; or to any occult Quality. Mr. *Baker* could find out that the Configuration seemed in some Measure to correspond to the Shell wherein it was formed, tho' he will by no Means allow it to be owing to it: For our own Parts we are to confess, that if we found a Cast evidently formed in a Shell, and its Configuration corresponding in a great Measure to the Structure of that Shell, we should believe it to be owing to it: But People who are, and People who are not, Members of the *Royal Society*, we find are apt to conclude very differently from the same

same Premises. Nothing is more certain, than that the Crystal must have been received into this Shell in a fluid State, and condensed within it; and it is equally certain, that Bodies often shrink in the condensing: If we consider that the Crystal, in this Case, would be certainly held fast in the transverse Furrows of the Shell, while it was less firmly held by the smooth intermediate Parts; it is evident, that it must shrink only in those intermediate Parts; and that these would therefore be depressed with Hollows, while the Matter retaining its Place in Furrows, would form the Ridges between them. This will appear to any body, at all conversant in Fossils, the regular Account of the Formation of this singular and pretty Specimen, which we cannot but be vexed to find fallen into such Hands as those of a Person so little able to give an Account of it.

C H A P. IV.

Of native Leaf Gold.

NATIVE Leaf-Gold is of the Number of those Substances known only to the Writers of the Philosophical Transactions. The Account of it that falls under our Consideration in this Place, has the Honour to stand in the forty-first Number of those renowned Works. The Author tells us, that he met with a Cave at some small Distance from *Mexico*, the internal Surface of which was every where covered with it: We don't father the Term upon him unfairly, his Words are, that the Cave was *gilded* all over, and that it was with a *Kind of Leaf-Gold*; we suppose the Distinction he means to express by the Words *Kind of*, is, that he does not suppose this to have been hammered out like the common Leaf-Gold of our Artificers, but to have been produced by Nature: After giving us a very poetical Account of the Cave itself, its glittering Canopy, and its repeated Eccoes, as also of his own Courage, his *Indian* Guide's Cowardliness, and his Opinion of Ghosts and Hobgoblins; he proceeds to tell us, that he snatched a Parcel of these mineral Leaves, and attacked them and the Sand that was about them in the common Way of Chemistry, to get the Gold from them; he repeats to us his Methods of attempting this by Acids and by Alkalis, by Roasting and by Boiling, by Quicksilver, by Vitriol, and by Salt-petre,

Petre; but, alas! all his Cookery came to nothing, all his Fire could not melt it, nor his Salts or Menstruums separate Gold from it; and, to use his own Phrase, it was so very froward, that it could not be brought to receive Mercury either by fair or foul Means. A Multitude of other curious Trials that he made on it, he repeats in the same elegant and figurative Stile, and in the Conclusion, frankly confesses, that all the Tortures he put it to, were not able to bring it to confess that there was any Gold in it.

After this Detail of this curious and philosophick Gentleman's Experiments on this Body, it may be proper to enquire into his Description of it, and examine what it really was. He tells us, that it was a Congeries of glittering Leaves, none of them exceeding the Breadth of a Man's Nail; that these, with the least Touch, divided into many thinner Spangles; and that, with a little Rubbing, they left the Hand gilded all over. Is it not somewhat amazing, that a Man should have had so much Chymistry in his Head, and so little Reason or Judgment as this Gentleman? Are the dividing with a Touch into other Spangles or the covering the Hands with a shining Powder, the Qualities of Leaf-Gold? certainly no; but this is not all, they not only are not the Properties of Gold, but they are the Properties of another fossil Substance, always composed of Flakes, and often of the Colour of Gold, which it was a strange Ignorance in the Author of this Paper not to have known this to be at Sight.

Muscovy Talc, commonly called Isinglass, is sufficiently known to every body; this is a Matter composed of large and broad Flakes almost colourless: There are a Multitude of other Species of Talc less useful to the World, and therefore less taken Notice of; they are composed of small Spangles, and are often of a silvery Whiteness, or of a golden Yellow. The Writers on Fossils have called these, from their glittering Appearance, *Mica*, distinguishing the Silvery looking one by the Name of *Mica Argentea*, and the Gold looking Kind by that of *Mica Aurea*. There is no Question but that the native Leaf-Gold of the Philosophical Transactions is the *Mica Aurea* of other Authors: And all that we can have to thank the Author of this curious Paper for, is, that he has told us he did not know that all was not Gold that glittered.

CHAP. V.

An Account of some petrified Saltpetre.

Petrifications have been at all Times of the Number of those Changes in natural Bodies that have in a peculiar Manner demanded the Attention of the Curious. It was impossible but that it should be very early discovered that there were such Changes produced in natural Bodies of many Kinds, since it is scarce possible to dig two Feet into the Ground in many Places, or to break off the least Fragment of a Rock in many others, without meeting with Proofs of it; the Remains of Animal and Vegetable Substances being buried in these Places, in Earth and Stone, and themselves, tho' they retain the Shape and even the nicest Lineaments of the Bodies they once were, yet being at this Time wholly of a stony Nature.

When it began first to be observed, that these Things were dispersed over the whole Earth, it was concluded, they could only be lodged in these Places at a Time when the whole Surface of the Earth was overflowed with Water, and that this was a Proof that the Earth was once so overflowed, or in other Words, of the Truth of the Account of an universal Deluge. This Account standing, however, unluckily in a Book which the great Genius's of the Age did not chuse to place any Faith in, because it was the only one that it was essential to them to believe; they attacked the Doctrine in the homest Manner by attempting to prove that these Bodies, which looked so like Shells and Teeth of Fishes, really were not, nor ever had been such; but that they were Stones of their own peculiar Kind, created Stones as others were, and formed in the very Places where they were now found, not created elsewhere and brought thither, and afterwards altered there, as the Diluvianists attempted to prove.

Some of these Gentlemen insisted, that they were formed by a plastic Power, others, that they grew from Seeds in the Earth, as Plants from their Seeds above it. It was in vain that broken Shells, Parts of Shells, nay, Shells perforated by the Instruments Nature has furnished other Fish with for that Purpose, in order to their preying on the in-

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cluded Animal, were produced to confute them : All Arguments were used in vain for some Time, but as the Truth will prevail at last, the Doctrine, after all this Opposition, became at length universally received.

The restless Mind of Man never knows where it should stop : When enough is proved, People are always for proving more ; and it frequently happens, that the Ignorance of these last Advocates does infinite Mischief where it meant to be of Service ; and not only exposes itself, but throws Suspicion over every thing else that has been advanced in the same Cause. It was no sooner allowed that petrified Animals, and Impressions of Animals on Stone, were Proofs of a Deluge, than some Members of a Church, too famous for Miracle-making, considering the Honour they should do to the Scripture, and the Profit they should ensure to themselves by engaging in a Commerce of these Fossils, which now began to be esteemed, and to sell at a considerable Price among the Curious, began to pick up what they could find, and to dig in their own Ground after more : Tho' they did not fail to find some in their Researches, they did not meet with so many as their particular Views had made them wish, they determined to make Fossils when they could find no more, and went to work with their Knives and Chissels on the Stones the Workmen had cast up in Digging. Had they contented themselves with copying the real Fossils they found in these new made ones, they might have been longer undiscovered ; but above such groveling Work, and ignorant of what Bodies could be buried in the Earth, and become subject to Petrification, they engraved on these Stones not only Shells, Teeth, and Bones, such as Nature shews us Fossil, but Birds, Beasts, and Insects ; Bees with their Honeycombs, Spiders and their Webs ; nay, and Suns, Moons, Stars, and blazing Comets. Many of these artificial Fossils are still existing in the *German Cabinets*, and the Figures of many more of them preserved in good Engravings in a Folio published on the Subject.

The *Royal Society*, to do them due Honour, were not long behind-hand in Accounts that testified to the World their equal Knowledge of the Nature of Petrification. The Entrochi Parts of marine Animals are described in their Transactions very largely, under the Name of Subterranean Vegetables, or *Rock Plants* ; and not having any thing wonderful enough of their own Knowledge, as to the petrifying of unpetrifiable Substances, they quote from elsewhere, Accounts of a
Child

Child petrified in its Mother's Womb, and of Blood-Vessels petrified in human Bodies. In fine, to exceed every Thing that the Absurd of all Times had come up to, they give us an Account in their hundred and forty-third Number, of a petrified Salt. It is not to any one Member of this illustrious Body that we owe this illustrious Account; there are two concerned in it, Capt. *Stunny* and Capt. *Collins*. They give us a very particular Account of not only the wonderful Fossil itself, but of the Progress of Nature in the Formation of it. The Place where they found it was of fifty-nine Yards perpendicular Depth, the Bottom of a great subterranean Cavern, called *Penpark Hole* in *Gloucestershire*; and they tell us, that in this Place it was not produced sparingly, but covered all the pendant Rocks with a Kind of Glazing: They inform us, that it had originally *distilled* upon these Rocks from the Earth above, and that *Time had since petrified it*.

Some People, who have visited this Place since, give its Depth at somewhat less than these Gentlemen have done; and on examining this glazing Substance brought up by them from off the Rocks, it appears to be a common crustaceous Spar, with no one Property or Quality of Saltpetre, nay, not with the least external Resemblance of it; so that these Societarians are much more inexcusable in their Opinion of this white Spar than the Planter mentioned in another Part of this Work, who took a Cave crufted in like Manner with a brown crystalline Spar, for a Mine of Sugarcandy.

CHAP. VI.

Of Rock Plants.

WE have at all Times been acquainted with Plants that grew on the Land, and Plants that grew in Water, but it is to the inquisitive and discerning Genius of the *Royal Society* alone that we owe the Discovery of Plants which grow in solid Rocks; a vulgar Genius would be apt to start at such a Thought as a Plant's growing in the midst of a hard Stone, every Way surrounded and enclosed by it, and would wonder by what Means it was to force its thro' Way such Resistances, and come to occupy a Place already full, already occupied with

a Substance harder than itself, and contiguous with the rest of an immense Mass; but these are Thoughts that only could occur to People who expected to find Things consonant to Reason in all respects, not to a Society who have every where shewed themselves above Reason, and who have given the World a thousand Instances that no Contradiction to it can be too great for them to receive. It was very early in their Transactions that one of their Members gave an Account of Plants whose Roots were absolute Stone, and yet the Part above the Earth in a flourishing Condition; it required but a small Stretch of Fancy farther to suppose Plants growing while they were wholly stony, and that indeed is a Character Coral comes so near to, that it would not have done the Author sufficient Honour as a strange and miraculous Discovery: The growing of such Plants in the midst of a Rock of Stone harder than themselves was the System reserved to do Honour to the Name of Mr. *Beaumont*.

The Bodies described by this Author are the *Trochitæ* and *Entrochi*, a Kind of extraneous Fossils, very common with us and elsewhere: His Account of them stands in the hundred and twenty-ninth Number of the Transactions. We must do Mr. *Beaumont* the Justice to observe, that he is not of the Number of those Authors who write upon a Subject before they have half examined it; his Error has the Honour to stand against as perfect an Acquaintance with the Bodies it relates to, as almost any body seems to have had. He had the good Fortune to be near *Mendip Hills*, a Place famous for the Things he writes about, and for such a Variety of them, that scarce any Species, or any Circumstance or Accident attending them, but is to be met with there; he had found, and describes in this very Transaction almost all the Kinds ever known, and has described them in such a Manner, as sufficiently shews that he had examined them in no cursory Manner.

Upon the whole, what does he conclude concerning the Bodies he had taken all this Pains to make himself acquainted with? why, that as he finds them in Rocks, they certainly grew there; and as he finds Bodies of a different Figure to which they are sometimes affixed at their Bases, that these are their Roots. When a Man is at the same Time to describe a Thing, and to form a System for its Formation, it is easy for him to frame his Description so as to assist his System. Nothing is more certain, than that the *Entrochi* are in general cylindrick Bodies, of the same Thickness all the Way, and not more than two
Inches

Inches long : They lie in the Rocks of hard Stone, immerfed in all Directions, oblique, tranfverfe and perpendicular, and they are not of one continued Subftance, but formed of flat Joints laid evenly on one another ; which Joints when fingle are the Trochitæ. Had Mr. *Beaumont* given this plain Description of them, it would have been found to contain very little that made for the Syftem of their being Plants. He tells us, that they grow *to a Foot or more in Height*, and that they frequently [are only rooted in the Stone, and grow up among the Clay that fills the Fiffures of it. He tells us, that thofe of a Foot in Height had their Stem of the Thicknefs of a Tobacco-Pipe ; fo that when we find Joints, as we fometimes do of the Thicknefs of a Man's Thumb, we are to conclude they have belonged to Plants of a Yard or two high.

He tells us, that many of them grow from plain *Radixes* of a round or angular Figure and peculiar Structure, and many others from the mere Stone, without any vifible Radix at all ; and obferving that they are naturally hollowed or perforated at the Center, and that Perforation filled up with Matter of a different Kind, he imagines that Matter to have been once the *nutritious Juice*.

He obferves, that the thick Stems of thefe Plants when they are found yet adhering to the *Radixes* already mentioned, do not always grow up fingle, but fometimes *four or five from the fame Root*. The Author, determined to make thefe Bodies Plants, takes care to exprefs himfelf every where in his Description by the vegetable Terms Trunks, Knots, Joints, Branches, and the like ; and gives fo many Proofs as he takes them to be of this real vegetative Growth, that a *Royal Society* muft have been of a very different turn from what any thing we have had Occafion to obferve in regard to fuch a Body fhews, not to have been convinced by him.

Not contented with thus firmly eftablifhing the Syftem of the Entrochi being Plants, the Author goes on to describe their very Manner of Growth, and, as if confcious of the Difficulty of absolute Stones growing, he mends it by a greater, advancing that thefe Plants are all originally Clay, and that they grow in that State, and are afterwards *transmuted into Stone*, or into that bright and clear Spar they ufually are found to confift of ; nay, and he is as particular and exprefs on the Subject of Transmutation as of the Growth of his imaginary Plants ; he tells us that the Change is not made immediately from Clay to Spar, but that
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the Clay by Degrees is turned into a coarse Stone, and that Stone is afterwards turned into Spar.

The Rock Plants, he says, begin their Growth *from the finest Parts of Clay*, and are at first *white, soft, and smooth*. It is by Degrees, he says, that they afterwards begin to have Ridges, Knots, and Sutures, as they came towards the Time of their Transmutation into their stony or sparry State. In fine, he concludes, that these Bodies cannot be denied to have true vegetable Life and Growth, since they have inward *Pith* and *Sap*, and *Joints* and *Cells*, which may very well supply the Place of Vessels.

Such is the Account given in the Philosophical Transactions of those singular Fossils the Entrochi. But however clearly convinced the Author of this Paper, or the Society who heard it, might be that it could not be denied but they were Plants, the Truth is certainly on the other side, and they are no more Plants than the Seeds of the Bidens are Animals, tho' equally asserted to be so in the same Works; these are indeed as certainly Parts of Animals, as those are Parts of Plants.

The Magellanick Star-Fish has its Arms round and jointed in the very Manner in which our Entrochi are; nay, the Perforation is much the same also, and the Ramnifications grow from them in the very same Manner as from the Entrochus; whoever compares a fossil Entrochus with a recent Arm of that Fish, will be convinced that there is little more Difference than what there must be between a recent and fossil Substance, between them. Their Roots also, as they are called, plainly express their being Parts of the Body, or Covering of the Body of some such Fish, and their growing four or five from the same Root, as Mr. *Beaumont* calls it, agrees as well with their being the Arms of such a Fish as all the rest. To this we may add, that they are of the very Size, as well as Shape and Structure, of these Arms of the Fish, and that all their Difference may be referred to the several Parts of the Arms which they have made, or at the utmost, to the slight Varieties of the different Species there may be of this Fish. Their being found in broken Pieces is not wonderful, for the Arms while recent are very brittle, and their being frequently met with crushed and injured is also a Proof of their having been soft and tender after they were perfectly formed, and having been petrified since that Time, not, as Mr. *Beaumont* supposes, of their receiving their perfect Form, and their Hardness at the same Period: In fine, the Spar of which they are composed at this Time is the same with

with that of which the Generality of the other Petrifications of marine Bodies are also formed ; the Spines and Shells of Echini, and a Multitude of other once Animal Substances in their Fossil State always being composed of this very Spar ; and it is, upon the Whole, scarce possible to have more Evidence of any Fossil of the extraneous Kind having once belonged to, or been a Part of an Animal, than we have of these Bodies having been the Parts of a Star-fish of this Kind.

We are to charge the Author of this Account of them, not only with Error, but with intentional Falsity ; the former may be very easily pardoned, but the latter, when from a Person who pretends to have nothing but Truth in his View, and when countenanced by a Body of Men who ought to be Judges of the Subject, has so very ill a Tendency, that it is and ought to be unpardonable. His mistaking the Remains of the Body of the Fish for Roots of a Plant, and his Imagination that Clay was turned by Degrees into Lime-stone, and the Lime-stone into Spar, might all be pardoned ; but when he relates absolute Falsities as Facts, he deserves no such Indulgence. He tells us, that he has seen Entrochi a Foot long, composed of mere Clay, and without their jointed Structure, and others gradually hardening and becoming jointed from this soft and smooth State : Could this have been believed by the rest of the World as readily as by the *Royal Society*, there had been an End of all Hope of knowing the Truth, in regard to this Part of Natural History. The Author has told us, that he found these wonderful Entrochi on *Mendip Hills* ; I have searched *Mendip Hills* for Fossils as carefully as Mr. *Beaumont* could, and brought as many Entrochi from thence, but soft Entrochi of a Foot long, are Things that neither he, nor I, nor any body else, ever did or ever will find : An Inch is the usual Length of what we meet with there, very few exceed two, nor is it probable they should be much longer any where ; there is a Possibility indeed of longer Pieces, nay, of whole Arms, except their Tips, being found, but it is no more than a bare Possibility, and if it ever happens, there is no doubt but that the Substance of them must be the same with that of our common ones.

The Change of Clay into Spar, that is of a vetrifiable Earth into a calcareous Stone, is against Reason and the Laws of Nature ; and the making Limestone, a Stone much harder than the Spar itself, an intermediate State between the two Extremes, one would be apt to allow could have been a Thought of no Man but a true Societarian. As to the

the Roots of these Plants of Mr. *Beaumont's*, it is pretty plain, even from his own Account, that they are not such, since the Plant does full as well without them; nay, that it is not so much as one Specimen in five hundred that has any thing of them: What he takes to be the Pith is no more than some accidental Matter, Stone or Earth, that has got into the natural Cavity of the Body; and all his other Articles of Analogy are about as just and judicious. How a Man could bring himself to believe that Vegetation had any thing to do with Fragments of Bodies lodged in all Directions in a hard Stone, frequently cracked and injured, and every where enclosed in so firm a Bed, is not easy to conceive. The *Derbyshire* Marble, which we have lately brought into Use, owes all its Beauty to these Bodies, and is indeed, in great Part, composed of them: It is not easy to put Mr. *Beaumont's* Account of them upon a properer Footing, than by desiring the Gentlemen of the Society to which it is addressed, to contemplate a Block of this Marble, and then pronounce their own Judgment upon it.

CHAPTER VII.

Of *Rusma*.

THE Philosophical Transactions afford us a vast Number of Instances how little Idea the People who wrote them had of the Subjects, which it is the great Business of the Society to study: The earlier Members set out with an earnest Desire of improving themselves in Natural Knowledge, and we see the strongest Instances of it in the Lists of Queries they occasionally propose, in which they never appear afraid to own their present Ignorance. Among the Number of the Things they desired Information about, was, that which is the Subject of this Chapter, *Rusma*, the famous Depilatory used by the *Turks*: We find a Desire to know what this *Rusma* is, in one of their earliest Sets of Queries, addressed to People who should visit those Parts of the World where Information about it might be had. It has been the Fate of most of these Queries never to have any Answer made to them: But to shew the true Taste the Members of that philosophick Body had for an-

answering such Queries, we have in this, an Instance of one that has that peculiar Honour. Mr. *Smyth*, who had been upon the Spot where *Rusma* was found and used, informs them in the two hundred and ninety-fifth Number, that it is a black Earth, and looks as if it had been burnt; the rest of his Account is, that it was used to take off the Hair, but this we are apt to believe the People who made those Queries understood before, by calling it a Depilatory. Such is the Information the Members of the *Royal Society* have been able to give their Fellow Members, of things immediately under their Inspection. *Rusma* is not an *Earth*, nor any thing like an *Earth*; it is a very hard and heavy Mineral, neither is it in general *black*; there are Pieces of it, indeed, that are absolutely black, a great many that are of a blueish black, but the Generality are of a rusty Colour with some Tinge of Reddishness, and usually it is spotted blueish or greenish. If it thus widely differs from an *Earth* in its Texture, and from Blackness in its Colour, it yet more differs from the *Earths* in its constituent Particles.

It is, properly speaking, an Ore of blue Vitriol containing that Salt blended in it as Metals are in their Ores, its Smell is strong and disagreeable, its Taste extremely nauseous; there is no Vitriol visible in it indeed to the naked Eye, but the Taste discovers it, and by Means of Water it may be yet more evidently proved that it contains a great deal of it. Water, in which some powdered *Rusma* has been boiled, very much resembles the famous cement Water of the *Neusol* Mines, and tinges a Knife, or any other Piece of smooth Iron, to a Copper Colour; when evaporated to a proper Consistence and set to shoot, it forms a Multitude of fine blue Crystals of a regular Rhomboidal Form, like those of common blue Vitriol, and having all the Qualities of that Salt. It is also found to contain some Orpiment, tho' not in its flaky Form; whence it is no Wonder that it serves the Purposes of a Depilatory when mixed with Lime, and applied to the Skin. The Orpiment alone would even give it Power to do this without the Assistance of the Vitriol.

The Ancients were acquainted with this Fossil, tho' under a different Name; they called it *Sory*, and used it to take off Pimples from the Face, and to cure the Tooth-Ach. People who did not carefully examine their Descriptions, thought the Substance itself was lost, because its Name was so; but on comparing their Descriptions of *Sory* with our *Rusma*, every Article of them agrees perfectly to it.

PART VIII. BOOK III.

Of Treatises on GEMS, by MEMBERS of
the ROYAL SOCIETY.

CHAP. I.

A precious Treatise upon precious Stones.

WE have occasionally observed, that the Philosophical Transactions of the later Years, have furnished more Matter for these Animadversions, than those of any other Period since the original Establishment of that Body. We are very sensible how much this Observation tends to the Honour of the Body; but Truth, so far as we know it, will always appear here, whatever Consequences the World may draw from it. The Paper, which is the Subject of our present Observations, is so strong an Instance of what we have just asserted, that it is a Question, whether, from the first Paper published in the Transactions, to the last read at the last Meeting, there can be found one that expresses a more perfect Ignorance of the Subject it attempts to treat of, both in the Man who wrote it, and in the Society who heard, applauded, and now espouse it: It is of no longer standing than in the Year 1747; it has a Place in the four hundred and eighty-third Number of these ingenious Works, and its Author calls himself *Robert Dingley, Esq*; Conscious of the Merit of it, or conscious at least of its truly Societarian Nature, he has soared above the common Forms on these Occasions, and while other People in general address their Discoveries to the President, or to some one of the Members supposed to understand the Subject, he addresses it immediately to the Society itself. If he should be in a Humour to apologize for this, by asserting that there is no body of the Society, who is so much as supposed to know

PART II

know any thing of the Subject, we must acknowledge that there is some Weight in the Excuse; but we are to observe, that had ourselves been in his Situation, before we had published a Paper on a Subject it would be some Disgrace to us not to understand, we would have found some body out of the Society to have asked their Opinion about it.

Mr. *Dingley* sets out with an Assertion, that he seems to have picked up from some body or other who knew something of the Matter, *viz.* that Gems are sometimes found of regular Figures and of a natural Polish, and sometimes of irregular Figures and with rough Coats or Crusts; that one of these Appearances is termed the Pebble Kind; and finally, that one Kind are found in the Beds of Rivers, and the other in the Fissures of Rocks.

This is an unquestionable Truth, and standing in the Front of the Paper, gives a false Promise of something good to come: It is impossible, however, to get down two Lines farther into it, without finding that this Truth is not of Native Growth; but has been transplanted from some foreign Place, (probably from our Commentaries on *Theophrastus*) and sits as ill upon the Author of the rest, as a hired Suit on the short lived Beau of a Birth-Day. It is evident from what immediately follows, that he does not so much as understand the Meaning of what he has stolen. The Form of Words, whether our own or any other Author's originally, it matters not, can signify only, that Gems sometimes grow in the Form of Sprigs of Crystal, and sometimes in shapeless Masses, like common Stones: That in the first Case, they have the same natural Polish that Sprig Crystal has, and grow to the Sides of the Rocks; and that in the latter they have the same Sort of rough Coat that Pebbles have, and are found like them in the Beds of Rivers. One would think the Distinction of these two Appearances of the Gems too evident to be mistaken; yet such is the Confusion of a truly societarian Head, as every Man after reading this Paper, must allow its Author to be, that he has absolutely inverted the Terms; and, like the *Chelsea* Gardener, who in his Course of Instructions on the Distinctions of Vegetables, told his Pupils that there were two Sorts of Barbary Trees, the *Seeding* and the *Seedless*, and that the *seeding* Barbary was that which had no Kernels in the Berry; he tells his about as wise Pupils of *Crane-court*, that the regularly figured and naturally polished Gems are one Kind, and the irregularly shaped, and naturally rough ones, are another; and adds, the naturally polished and regularly

figured, are the Pebble Kind, and are found in the Beds of Rivers ; and that those which are of irregular Shape, and have rough Coats, are the other Sort ; he seems ashamed to use the Term Sprig Kind ; but he expressly adds, that they are found in the Fissures of Rocks.

When a Man sets out with a Blunder, the Effects of it are usually very happily seen in all the rest of his Work : This Gentleman goes on in the true Spirit of his setting off, to tell us, that the Antients generally engraved on the first or regularly figured Sort, which does not happen, indeed, to be exactly the Fact, they generally having met with the latter ; and as appears from the concurrent Testimony of all their Writers, always preferring them.

Strengthened in Error, he goes on in the next Place, to tell us what the Figure of these regularly shaped and naturally polished Gems is. This every Jeweller could inform him is an angular one, most frequently Hexangular, and always approaching to that of one or other of the Genera of Crystal : This is a Truth, that not only every Workman, who ever met with a naturally polished and regularly figured Gem, could inform him of ; but that every Collection of the Gems, in their natural State, gives abundant Proof of ; the Beryl and Emerald being usually in this State, of the Figure of common Sprigs of Crystal, the Amethyst usually of the same Figure, except that the Pyramids are large and the Columns shorter, often indeed scarce discernable, and the Diamond itself, when in this State, resembling those perfect and short Crystals, which are composed of two Pyramids, joined Base to Base, without any intermediate Column. All this, however, seems wholly unknown to this qualified Writer, and the Figure he describes, as that of the naturally polished and regularly shaped Gems, is a long Oval, inclining to a Point at each End, convex on each of its Faces, with a Ridge running from End to End on the Underside, which is divided by it into two Faces, both which are also parted from the upper Face, by a Ring running round the Oval.

What could a Man who had studied only Fossils, and who knew the Gems no otherwise than in their natural State, as found in the Earth, think of such a Figure as is here described ; how many very hard Names must he call the Author. It is very certain that Nature never did, nor according to the stated Rules by which she acts, never will, nor ever can furnish any one Stone of such a Figure as this : But People who have studied

the Works of Art as well as those of Nature, and who are acquainted with the Remains in this Kind of the ancient *Greek* and *Roman* Empire, will be able to save this Author's Credit, as to his Veracity, and throw all the Blame in the right Place, on his want of Judgment. It is not more certain that Nature never formed, or ever will form, one single Stone of the regular Shape he describes, than that he has seen a great Number in the Collections of the Curious, which perfectly answer his Description; all the Mistake is, that he has taken the Shape, which the Ancients wrought their Gems into, before they set them or engraved on them, for that which they had from Nature.

If we are not misinformed, this Gentlemen, tho' no body would suspect so much by his Paper, is, or has been, a considerable Trader in Gems. We would ask him, if among the great Number of rough Gems of various Kinds, which must have passed thro' his Hands, he ever met with one of this Shape; or whether any body else in the Trade ever did; or any body concerned in the collecting of them abroad, nay, or so much as any Writer that can be depended upon, of any Age or Nation, has described such a one? The Answer to all these Questions must be the Monosyllable, No: And we are apt to believe it a pretty fair Conclusion, that if we have as much Proof as it is possible to have of a Negative, that Nature does not at this Time, nor has in the Time of any of the Writers we are acquainted with, produced such shaped Stones, that she never did produce any such.

If the Author of this curious Paper should defend himself against these Proofs of his Error, holding them light, because of the negative Kind, there are some others of the contrary Sort, some positive ones which tend very unluckily the same Way. If he will be pleased to examine the oldest *Greek* and *Roman* Authors, People who wrote at the very Time when the Thing was doing, that we are now disputing about, he will find not only that they have none of them any where mentioned the finding of but a single Stone of this Shape; but that they have expressly mentioned their Meeting with them in rude irregular Forms, and working them into this Shape, complaining very heavily of the Trouble some of them gave them in the doing it; nay, and they even go so far, as to give us the Reason of their working them into this Shape; and tell us of the Materials, and the very Tools they used in the doing it.

The

The original Use of all precious Stones, we find, by the joint Consent of all the Writers of Antiquity, was for engraving Seals on: No Man ever kept one of them with any other Intent; and they even express the Words *a Seal* and *a Gem*, by the same Greek Term *σφραγίς*: The Stones of any Size they for many Ages always worked into Seals; and it was for the Convenience of using them as such, that they gave them the Form which this Gentleman takes for their natural one, and this they always did before they engraved any thing upon them. In After-times they got into a Way of engraving also on flat and other shaped Stones; and from that Time, a diligent Enquirer into Antiquities, will find this Form described by Mr. *Dingley* as the natural one, became much less common. The smaller Stones of the same Kinds, they barely polished; and either set in Gold Vessels, by way of Ornament, or bored them thro', and made a sort of Bracelets of them. None of these, either of the set ones, or of the strung ones, ever had this peculiar Figure described as their natural one by Mr. *Dingley*; yet this, were it really and truly the natural Figure, would be seen as much in these as in any of the large ones; Nature using the same Regularity in forming all the regular Stones we meet with at this Time, with no sort of Partiality in regard to Size. The hexangular Crystals in the Cracks of small Stones, which scarce weigh half a Scruple apiece, being as perfect and regularly figured as those of *Switzerland*, which sometimes weigh a hundred Pounds.

The strangest, however, of all Proofs of these Stones of the Antients being formed by Art, is the People's telling us how they were formed, who lived in the very Age when that was done. These very People tell us, that the Materials used to work them with, were Emery and a very hard Stone, which they called the *Cos Armenius*: And *Pliny* goes so far as to describe the Tools they used in cutting them into Shape, which were Diamonds set in Gold, in the very Manner of those with which they engraved them afterwards, as he expressly tells us in another Place: *Adamantis Fragmentis auro inclusis*, are his very Words; and they are Words which it is impossible to put any Construction upon, except the right one.

Mr. *Dingley* is not content with the Error of thinking these Gems of the Antients had their Form from Nature; he will have it that they had also their Polish the same Way. We think it is Pity, a Man bold enough to advance so much, should stop short there: It would have been

been but a little Step farther to assert, that they had the Engraving from Nature too ; this would have made them Curiosities indeed ; and we dare assure the Author, he need not, after what he had given them, have been so squeamish as to refuse them this ; for that Nature is full as likely to have done one of these for them, as the other. He tells us expressly, that their natural Polish excelled all that could be done by Art, and that they therefore engraved on them just as they found them ; let us hear what they say about it themselves : Why, they all declare against Mr. *Dingley* ; they tell us that they polished the Gems they intended to engrave on with great Care and Pains ; nay, they give us an Account of their Materials used for this Purpose, as well as for the cutting ; they expressly tell us, that they did not polish the Gems with the Powder of the Porus, a Stone, with which, ground to a proper Fineness, they used to polish Marble ; but that they employed to the Gems, the hardest Substances they could procure, such as the Emery, and the *Armenian*, and the *Cyprian* Cotes, before mentioned ; and Powder of an Ostracite, which *Pliny* tells us was at that Time found in the *Indies*, and would serve in the Place of the other hard Substances, in the polishing of these Gems. It appears there from this, as well as a thousand other Instances, properly commemorated in the Course of this Work, that there is some Truth in the Maxim we have so long, tho' so much in vain, been inculcating into the Members of this celebrated Body, that it is proper Men should read before they write ; and that if the Writers will not be brought to take this unfashionable Trouble, that People ought to read before they attend to them.

We are confident, that if Mr. *Dingley* had ever read either the Ancients or any body that has but tolerably quoted the Ancients, he would not have flown in this Manner in the Face of them all, in regard to the Things they must have been Eye-Witnesses to ; and that if the *Royal Society* had taken the same Measures, that they would have known too much of the Matter to suffer his Paper to be read, or at the utmost, that they would have prevented the Scandal of printing it. One would be apt to imagine that Disgraces of this Kind might be easily prevented, even tho' the Society in general were as ignorant as the particular Member who affords them their Entertainment, by their asking the Opinion of some Person out of their Body, if they had no body in it qualified to give one ; but there seems a Fatality attending them, preventing every thing that might save their Reputation.

In

In regard to this very Paper, all this publick Censure might have been spared but for their own Obstinacy. The President did me the Honour of asking my Opinion as to the Assertion of these Gems having been figured and polished by Nature : I treated it with the same Contempt at that Time, that I have done here, and gave that Gentleman the same Proofs of the Absurdity of it. He told me, he was convinced ; but he seems, by the Result of that Conviction, to have been convinced too, that such a Paper was very proper to be read before the *Royal Society*, and to be printed in the *Philosophical Transactions* ; for he procured it the Honour of both.

To this erroneous Account of the Form and Polish of the Gems engraved on by the Antients, the Author has added a Catalogue of their Names, every Way worthy it, and every Way worthy the *Society*, of which, since his Publication of this memorable Piece, he has been held a very worthy Member, not less by the Society than by ourselves. When a Man speaks of the Gems of the Antients, we would imagine that he would speak of them under the Names by which the Antients call them ; or when he treats of them as a Man of Science, for such a Character every Man assumes who publishes in the *Philosophical Transactions*, it would be natural to expect to find them under such Names as Men of Letters, or as the Authors who have treated of such Subjects, call them by. We are sensible that an ignorant Jeweller may take a Cornelian for a *Beryl*, or a Workman may call an *Aqua Marina* an *Egg Marine* or an *Eagle Marine*, but we would not have such Mistakes, or such Mispronunciations, fixed into real Names, or countenanced by the *Royal Society of London* : Yet nothing is more certain than that this Author has done the Society the Honour of making them establish such, as the acknowledged Names among us ; and that unless such a Censure as this had appeared, to protest against it, all the Absurdity of Mr. *Dingley's* Names had been fathered upon the Nation in general, and the next impudent Foreigner who had written on Gems, had told the World that the *English* call red, yellow, and white Stones *Beryls*, and the coarsest Pieces of the *Prasius*, the Prime Emerald. We are sensible that it will be objected to us, that Mr. *Dingley* has treated of them under the only Names by which he knows them ; but it is easy to answer, that it is in every Man's Power to let alone a Subject he is not a Master of.

The

The first Gem of the Antients, mentioned by this Author, is the *Beryl*, which, he tells us, is of Three Kinds, a red, a white, and a yellow; but we are to inform him, that the Ancients never called or knew any Stone that was either red, yellow, or white, by this Name. The Beryl of the Ancients was the same with the Beryl of our Times, when that Term is properly used; that is, with the *Aqua Marina*. The Antients knew this Gem, and only this, under the absolute Name Beryl, but they took in several others as Species of it with their peculiar Epithets expressing their Differences, tho' all of the same general Colour; the later Writers of many Ages have also kept to the same Name for it; but of late the *Italians* have set on Foot the Name *Aqua Marina* for this Gem, and since that, the Term Beryl has been given to various Stones by our Jewellers, not only to several of the semi-pellucid Kind as the finer Cornelians, Chalcedonies, and the like, but brown Crystal, and several other of the pellucid Stones, have been also called by them, by the same Name. We are not, however, to transfer the Blunders of such People into the List of real Names. The Ancients did sometimes engrave upon the red and yellow Cornelians, and on the Chalcedony, but then they called them Cornelians and Chalcedonies as we do to this Day; the Name of Beryl, neither they nor any body since, who know any thing of the Matter, ever gave to any thing but a Stone of the pellucid Kind, of a Sea-green or bluish green Colour. All the Writers on Gems agree in the Opinion of *De Laet*, *quibus nihil viroris est non sunt ad Beryllorum Classem referenda*, those Stones which have no Green in them, are not to be referred to the Beryl. How does this agree with the red, and yellow, and white Stones of this Author, which he has called Beryls, nay, and described as the only Beryls in the World, for he names the true Beryl long afterwards, under the vulgar Name of the *Aqua Marina*, as having nothing at all to do with that Appellation.

After the Beryl he mentions the Plasm, or, as he afterwards calls it, the *Prime Emerald*. There is but one Sense of the Adjective Prime, in the *English* Language, and that a natural and proper one, as the Word is derived from the *Latin*, *primus*, *first*; it signifies the finest or most excellent Thing of its Kind. The Term prime Emerald therefore as an *English* Phrase, can signify properly nothing but the finest Emerald; yet it is a little unlucky that this Gentleman means no Emerald at all by it, but another green Gem, and that a very coarse one: He tells us himself, that it is nearly of the Colour of stagnated Water, sometimes tolerably clear, but for the most Part full of black and white

Specks and rather opaque: A very fair Description this of an Emerald, nay, of a prime Emerald too. It is evident enough that it belongs to another Stone. The Gem the Author means by it, is the *Prasius*, so called both by the Antients themselves, who engraved on it, and by all the Writers of Credit since. The *Italians* have called this *Prasina* and *Plasma*, and many Authors *Matrix Smaragdi*, the Emerald having been sometimes found in the same Mass with it, and as it were growing out of it.

We allow that this Term, prime Emerald, is, as well as the others selected by this Author, in common Use among the Traders and Workmen, but we would not have the ignorant and improper Terms used by these People, exalted into the Rank of real Names, and established as such by a *Royal Society*.

The Hyacinth, or Jacinth, he tells us, is of a deep tawny Red, like old *Port Wine*. It is very true, that many Jacinths are of this Colour, but if Mr. *Dingley* is or ever was a Jeweller, he ought to know that there are other Colours of the Hyacinth beside this, and if an Antiquary, he ought also to know that all these others are also engraved on by the Antients, as well as this old red Port coloured one. There are indeed four distinct Kinds of the Jacinth, as to the Degree of Colour now known in the Trade, and worked by the Antients. 1. The Jacinth *La Belle*, of a Flame Colour, formed by a Mixture of the most glowing Red, and the brightest Gold Yellow. 2. The Saffron Jacinth, in which the Red is deeper, and the Yellow less lively. 3. The Amber Jacinth, of a dead whiteish Yellow, with but little Red among it. And, 4. The Jacinth called by many the *Rubacelle*, of a deep strong Red, with a Cast of a dusky Yellow. The Cabinet of the *French King* affords Instances of every one of these Kinds wrought by the Antients.

The next Gem mentioned by this truly societarian Author is the *Chrysolite*. This he tells us, is of a *light green grass Colour*, and is supposed to have been the *Beryl of the Antients*: He adds, that it is transparent, but not lively; we should be glad to know who it is beside Mr. *Dingley* that supposes the *Chrysolite* of our Times to be the *Beryl of the Ancients*: Nothing is more certain than that the *Beryl of our Times* (we do not mean the *Beryl of Mr. Dingley*) is the *Beryl of the Antients*. And it is as certain, that this *Chrysolite* is the Stone they called the *Topaz*; for our *Topaz* they called, from its yellow or golden Colour,

Colour, the Chrysolite, or Gold coloured Gem, as that Word expresses. The true Colour of this Chrysolite of our Time is a pale dead Green, often with a Cast of a brassy Yellow in it. Some of the engraved Gems of the Antients of this Kind have this yellow Cast, and others not, and it is very evident from the concurrent Testimony of all their Writings, that they call this Stone in either Case the Topaz.

He next mentions the Oriental Crystal or fine Pebble Crystal, which he tells us is very little inferior to the *white Sapphire*. We have as good an Opinion of the Gems of the Antients as Mr. *Dingley*; and in regard to many of them a somewhat better. Whenever they have engraved on Crystal, it is evident that they have chosen extremely fine Pieces; but we are to inform Mr. *Dingley*, that what he calls Crystals, very little inferior to the white Sapphire, in many of them is the very Stone he means under the Name of white Sapphire. To explain this Matter properly, we are to observe that the Oriental Gems in general, as well as the Sapphire, are sometimes found without their Colour. The Matter of the Topaz, of the Amethyst, and all the other Oriental Gems being sometimes found in uncoloured Masses. These have the Appearance of Crystal, but they have a Lustre with it which makes them in some Degree approach to the Diamond; they are properly indeed of a middle Degree between Crystal and that Gem. The Jewellers call all these Stones white Sapphires, and know their Value very well. The Antients seem to have been fully as well convinced of their Worth, and to have taken as much Pains to engrave on them as on any.

Next to the Oriental Pebble, this Author mentions the Garnet, which he tells us is of the same Colour as the Jacinth, but more enclining to Purple.

We are sorry to find it necessary to instruct a Man in his own Way; but we are to inform Mr. *Dingley*, that the *Garnet is not of the same Colour with the Jacinth*, and that *the Jacinth does not incline to the Purple at all*. The red Gems are only to be distinguished from another by the secondary Colour in their Tinge: The Red is Red in all of them, but it is not entire and unmixed in any. In the Garnet the Red has an Admixture of Blueish, in the Jacinth it has an Admixture of Yellow. The one of these therefore tends to Purple, and the other to Flame Colour; and all the genuine Distinction between the red Gems is lost if we call, as this Author does, the Colour of the

Jacinth and Garnet the same, but with a little more of the one or the other Cast.

The last Gem he mentions, as engraved by the Antients, is the Amethyst, which he says is of a deep Purple. It would have been too much for any body to have mistaken the Colour of the Amethyst; but we are to observe, that all the Amethysts in the World, tho' Purple, are not deep Purple; but that there are some very pale ones, as well found at this Time, as engraved on by these famous and inimitable Workmen of Antiquity.

To all this the Author adds a general Table of what are usually called Precious Stones. This, according to the Custom of the Societarian Writings, is at once redundant and imperfect. He repeats all his former Errors in it, and adds some new ones. Upon the whole, one would be apt to wonder what could induce this Author to write on a Subject of this Kind. In order to treat rationally of the Gems of the Antients, a Man ought certainly to have read the Antients; and in order to treat of Gems in general, one would suppose something more were necessary than barely to know them by the Names by which the Lapidaries and other ignorant People call them.

Did Mr. *Dingley* imagine that the *Royal Society* wanted to be informed that an Emerald was green, or a Ruby red? if he did, never let them hereafter deny, but that their own Members think worse of them than the Author of these Papers does; if he thought they wanted any farther Information about them, it was a strange Blindness that prevented him from knowing it was not in his own Power to give it.

CHAP. II.

A Dissertation on the Turquoise, or Turkey Stone.

IF there be any one Subject in treating of which the Societarian Writers have shewn themselves to be more eminently ignorant than the rest, it is the Fossil Kingdom: We have scarce had occasion to mention any Paper on this Subject but with particular Testimony of our being of this Opinion. Mr. *Dingley's* precious Treatise upon Gems has already been honoured with no inconsiderable Share of Contempt;

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to do the Paper now under View perfect Justice, we cannot but acknowledge that it deserves to be annexed as a Supplement to it, as it treats of a Gem that Author has not mentioned, and treats of it with the same confident Assurance of Certainty, and with much the same Knowledge of the Subject as he does of the others. This curious Piece stands so late as in the four hundred and eighty-second Number of the Transactions; its Author is no less a Man than one of the Secretaries to the *Royal Society*, the very celebrated and judicious Dr. *Cromwell Mortimer*.

The Occasion of this memorable Paper was, that the Doctor had an Opportunity of shewing to the *Royal Society* a very curious Specimen of the Turquoise, as he says; the Truth, however, is, that he was able to shew them a Thing, which one Jeweller had bought of another Jeweller, which neither of them knew what to make of, and which he takes no little Pains to shew he knew as little of as either. The great Intent of this Paper seems to have been to shew the Doctor's Erudition; in lasting Memorial of which he quotes of the *Latins* the very famous *de Boot*, on whom he seems to build his whole Knowledge; *Salmasius's* Commentaries on *Solinus* and *Pliny*, and, lastly, *Cæsius*; and of the *English*, Dr. *Woodward's* Letter to Sir *Joseph Hoskins*, and my Commentaries on *Theophrastus*: All that he has to do with *Cæsius* is, that he quotes him for having quoted three of what he seems to think the greatest Writers in the World, *Neylius*, *Caussicus*, and *Albertus Magnus*; as to *De Boot* he has taken some Pains to prove that he could not translate him, and, as to *Salmasius*, that he does not understand him; as for the other two he seems to come somewhat nearer understanding them, but he does not seem to pay any great Respect to their Opinions.

It has been observed by Lord *Hallifax*, that a Man who has read without Judgment, is like a Gun charged with Goose Shot let loose upon the Company. This has been quoted, we do not pretend to say with how much Justice, against a very celebrated Writer of the present Age, whose Name we have more respect to, than to mention it in the same Page with Dr. *Mortimer's*; but however unfairly used, in Regard to the one of these Writers, nothing can be more justly applicable than it is to the other, in Regard to the very Paper we are now animadverting upon. We have already mentioned the Authors his great Reading had extended itself to. We are to take some Notice of what he has borrowed from them: He tells us, that *de Boot* says, that the Colour

of this Gem is a *Variation of green, white and blue*; that they are of two Kinds, Oriental and Occidental, and that of the former, few exceed *the Size of a Walnut*; and the Doctor adds, that he quotes one in the great *Duke's Cabinet*, with a *Head of Julius Cæsar engraved upon it* as a very extraordinary Sample. That, he says, some of the *Turquoises* of the oriental Kind, *keep their Colour always*, and are called *Stones of the old Rock*; and that others lose their Colour gradually, and are called of the *new Rock*. The last Quotation he gives of this Author, is an Account of a *Turquoise*, which having lost its Colour on being laid by, recovered it again on being worn on the *Finger*.

It is but a single Passage that we are honoured with from *Salmasius*; this is, that *many had mistaken the Turquoise for the Cyanus of the Antients*; but that *the Cyanus was transparent like the Sapphire, whereas the Turquoise was a sort of Jasper*. *Mylius, Albertus Magnus, and Caussin*, he seems to mention with peculiar Respect; and to quote them from *Cæsius* as the Standards of all true Knowledge. As to poor *Woodward*, he only mentions him to abuse him, or at best to pity his Ignorance; which, from *Dr. Mortimer*, surely is as heavy Abuse as one can well expect to see. As to myself, he seems to quote me only for the sake of shewing that he had read me; for he acknowledges, and that with some sort of Vehemence, that he *does not in the least deny* what I have said of the *Ebur Fossile of Theophrastus* to be true: We are to inform him, however, that if he had gone a little farther in those Commentaries, he would have been tempted to save us this Occasion of laughing at him.

After what the Doctor has quoted from others, we are to take some Notice of what he has said of his own. This may be comprized in a few Sentences, tho' those are not inconsiderable ones. He says, *he believes all the Turquoises Dr. Woodward had seen, were such as he describes; but that the Turquoises of the old Rock, are another Thing: That these Turquoises of the old Rock, which keep their Colour, are all of another Kind; that the Specimen he produced shewed as much; and that the Turquoises of the Woodwardian Kind only, have the Property of recovering their Colour again, from the Effluvia of the Person who wears them*.

As to *de Boot*, the Doctor has not treated him fairly: That he has not translated him justly is evident; but whether this has been out of Ignorance of the Language he writes in, or whether out of Disingenuity, we will

will not take upon us to determine. It is certain that *de Boot*, Blunderer as he is, is not quite absurd enough to say what the Doctor wanted him to say; and it is possible, that, tho' knowing better, he might translate him unfairly, out of a thorough Knowledge of the reverence the *Royal Society* always pay to People of that Stamp, and a perfect Conviction that none of them ever would discover the Fallacy by reading him: If the Doctor chuses to save the Credit of his Learning, by acknowledging this to have been the Case, he has our full Consent to the use of the Evasion, whether it have any Truth in it or not. He tells us, that *de Boot* says, the Colour of the Turquoise is a *Variegation of green, white, and blue*; but *de Boot* says quite otherwise; he tells us, that the oriental ones were blue, with a little greenish among it; and that the occidental were greener, and often had more white in them than they should have: He very judiciously says, indeed, that the Colour of every Turquoise is *composed of* a Mixture of those three Colours; but with Dr. *Mortimer's* Leave, there is some small Difference, between being composed of a Mixture of three Colours, and variegated with them; the one expresses what *de Boot* means, a compound Colour diffused equally thro' the whole Stone, and the other a Variety of three Colours in the same Stone.

One would wonder what should induce the Doctor to describe a Turquoise, as consisting of a Variegation of three several Colours, green, blue, and white; no body ever saw such a Turquoise; no body would ever purchase such a one; nor would any Jeweller receive such a Stone into his Shop, under the Name of a Turquoise. A Sight of the Thing that was the Subject of the Doctor's Paper, would have explained this, however. It was, as the Doctor describes it, variegated indeed, with two of the Colours mentioned by *de Boot*, the green and the white: As to the blue, that indeed was wanting; but the Doctor seems to hold the World in extreme Contempt, for supposing this to be the true Colour of the Turquoise: His Specimen was green and white; and the Business of his Paper, was to prove this Specimen a Turquoise of the old Rock.

De Boot, the Doctor tells us, limits the Size of the Turquoise, to that of a Walnut. As to that which he mentions from him, as preserved in the great Duke's Cabinet, we are to inform him, that it is not mentioned in *de Boot*, because of its having the Head of a Roman Emperor engraved on it, as he seems to suppose; but because it
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was of that greatest Standard Size, of the Bigness of a Walnut: *De Boot* tells us as much, tho' the Doctor could not or would not understand him, and takes care to say nothing about it. It is still in Being, and is, indeed, from its Size, a very extraordinary Sample, as *de Boot* calls it; tho' we cannot suppose that *de Boot*, or any body else, except Dr. *Mortimer*, would think it very extraordinary to find a Stone in the great Duke's *Museum* with a Head of *Julius Cæsar* upon it.

The Doctor chuses to be determined by *de Boot*; let us, therefore, examine candidly by this very Author, whether this famous Stone of his, was, as he attempts to prove, a Turquoise of the old Rock, or whether, even according to his own Author, he is mistaken.

De Boot's Characters of the Turquoise of the old Rock, are only these. 1. That its Colour is blue. 2. That it is a small Stone, never exceeding the Size of a Walnut; nay, himself acknowledges that he never saw one larger than a Hazel Nut: And, 3. That it always retains its blue Colour. The first and third of these Characters, are relative to the Turquoise of the old Rock only: The second, or that which limits its Size to that of a Walnut, to all Turquoises in general. The Doctor's Specimen is not blue, but a Variegation of green and white in Colour: If it ever had any blue, it must have since lost it; it is, therefore, according to the Decision of *de Boot* himself, not a Turquoise of the old Rock. As to Size, he informs us in this very Paper, that it is *twelve Inches long, five Inches broad, and in some Places, two Inches thick*. We are apt to believe, that a Mass of these Dimensions must be somewhat larger than a Walnut; and, therefore, according to the same *de Boot*, whom the Doctor appeals to as the great Judge of the Case, his Stone was no Turquoise at all.

As to the Doctor's Passage from *Salmasius*, it seems of the Nature of those, which Dr. *Abraham Johnson*, in his most elaborate Treatise, intitled, *Lucina sine Concubitu*, says, are quoted for the sake of a Quotation; but as it often happens on these Occasions, it is quoted a little un-
luckily: He says, that the Turquoise is not the same with the Cyanus of the Antients, for that the Cyanus was transparent like the Sapphire; which is very true, indeed, for neither their Cyanus, nor their Sapphire, were transparent at all; this, however, is not the Truth the Author meant to express. *Salmasius* evidently meant to say here, that the Cyanus was transparent; he even says, that our Jewellers sell this
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and the Sapphire indiscriminately under the same Name; but the same *Salmasius* has proved very sufficiently afterwards, in another Part of his Work, the Truth of our Assertion, that neither the Cyanus nor Sapphire of the Antients, were transparent at all: As to our Sapphire, it was unknown to them under that Name, they called it the Sky-blue Beryl: What they called Cyanus was our *Lapis Lazuli*; and what they called Saphirus, the same Stone; only that it had the Gold-coloured Matter disposed in Spots, in Form of Stars in it, not in Veins, as it is in the common *Lapis Lazuli*. We do not blame Dr. *Mortimer* for affecting to quote from *Salmasius*; he was a Man of vast reading, and it is some Credit to a Writer of the second Rate to have read him: We would remind the Doctor, however, and Writers like the Doctor, that Quotations are Things that require more Care than such a random Way of using them seems to bespeak.

The Excellency of *Salmasius*, is his having compiled Passages of the Ancients together on the same Subject, and very happily understood them. Learning was his almost sole Talent; Knowledge in the Sciences he in many Cases shews he wanted; he had been, when he wrote this Passage, reading some of the ancient Authors, who prove, that the Cyanus and the Sapphire of their times were almost the same thing; he did not then suppose, that the Sapphire of their times and of ours were two different Stones, and that their Sapphire was only a kind of our *Lapis Lazuli*. When he discovered this he put it down too, but without giving himself the trouble of altering the other Passage, which stood perhaps two or three hundred Pages off. We mention this, not out of a Desire to censure *Salmasius*, but to put Dr. *Mortimer* in mind, that when a Man quotes any thing from another, especially when it is mere Matter of Ostentation, he ought to read every thing that Author says of the Subject first. As to *Salmasius*, his hasty Determinations may indeed serve the Purposes of Authors of this Stamp well enough, but his true Use is that of an Index to the several Authors he quotes: He very happily puts one in mind of every thing that has been said upon a Subject, and if he does not always draw the right Conclusions himself from what he quotes, it is every Man's Fault, who has so much before him, that he does not do it for himself. We are not, however, to pass over even this Translation of the Doctor's, without putting him in mind of being more accurate on these Occasions for the future. He tells us, that *Salmasius* says, many have made this Mistake, representing it as a vulgar Error, which

it certainly never was, nor indeed does *Salmasius* say so. He says, some of the Learned had fallen into such an Error: *Nonnulli Doctorum* are his Words, which do not over well agree with the Doctor's Translation.

As to the Doctrine of the Effluvia of a human Body restoring the Colour to a Gem that had lost it, we freely leave the Doctor in possession of all the Credit of it. It is, indeed, truly of the societarian Kind, and will be long remembered as an Honour to the Author, to the Society he has the good Fortune to be in Office under, and to the Transactions in which it is printed.

As to Dr. *Woodward*, notwithstanding the Contempt with which the great Dr. *Mortimer* mentions him, we are really apt to believe that he had seen as many *Turquoises* as himself, perhaps somewhat more, and that he has written somewhat more wisely about them. Something might, perhaps, be said also, in regard to the Author of the Commentaries on *Theophrastus*, but this will come better from any body than from the Author of these Animadversions.

We have now gone thro' the Doctor's Quotations, and Quotations of Quotations, and come to the last Part of his Work, which contains his own Account of the Substance which had been the Occasion of all this Profusion of Learning. He tells us, that this Specimen proves, that the *Turquoise* is no Bone, nor Part of one; for that it is plain by its Shape, that it is not any Part of an Animal Bone. He adds, that its Botryoid Form, is to him a Demonstration that it is a Product of the Fire, like the *Lapis Hæmatites* or Blood-Stone; he adds, that those *Turquoises* which Dr. *Woodward* and Dr. *Hill* describe are false ones, and that this Specimen (which he publishes this Dissertation on) is a true one. He says, indeed, that they differ no otherwise, than as one of them, that is his, is the *Turquoise of the old Rock*; and the others, or ours, are *Turquoises of the new Rock*; but he chuses, however, to distinguish his by the Name of the *Turchesia vera*, or true *Turquoise Stone*; and the others, by that of *Turquesiæ spuria*, or Bastard *Turquoises*.

He adds, that his is the true *Turquoise*, from the most evident of all the Reasons in the World; namely, for that he has found it to be a very rich Copper Ore: But lest this should not be thought convincing enough by some obstinate People, he gives several additional Proofs: He says, he found it run into a Slag in the Fire, not calcine as a Bone would have done; and that its Hardness was about that of the common white Marble. Two other very remarkable Circumstances which he mentions,

mentions, as to this fiery Trial, are, that its Colour is *not mended by Heat*, and that it grows brittle under it.

It must be acknowledged, that these Remarks and Observations plainly prove, that the Doctor has as much natural Knowledge and Philosophy about him, as Learning ; his Reasoning is exquisite.

He says, that the *Turquoises* of *Woodward* and *Hill* are not *Turquoises*, because they are *Bones*, and that *Bones* are not *Turquoises*, because his Specimen is not a Bone. Nothing is more certain, than that his Specimen of a Foot long, and of a green and white Colour, is neither a Bone nor a *Turquoise* ; this Reason, therefore, must be allowed extremely conclusive. He argues, that the *Botryoide* Form of this Stone, is a Demonstration to him, that it is a Product of Fire, like the *Lapis Hæmatites*. It may be a Demonstration to him of this ; but a Man who knows any thing of Fossils, knows, that a Body of that Class, may be *Botryoide*, without ever having passed the Fire. What does this ingenious Gentleman think of the *Botryoide Pyrites*, a Body as elegantly *Botryoide* as *his Turquoise*, and indeed somewhat more so, which yet can never have passed the Fire, because the certain Effect of the Matter it is composed of passing the Fire, is its loosing its Texture and becoming purple ; whereas this unlucky Body, created sure for the tormenting of Dr. *Mortimer*, has its Texture, like that of the other *Pyritæ*, and its Colour unaltered.

The Doctor thought the Structure of this Body proved its having been in the Fire, and its present Form he takes to be the Effect of it : If he had looked a little farther into it, he would have found its Structure, which he builds so much upon, to be striated, and that in a most elegant and regular Manner : This is a Structure which Fire could not give a calcinable Body, as this is, by his own Report ; nor could even suffer to remain with it, if it had been possessed of it before ; it is therefore demonstrated by its Structure, not that it is a Product of the Fire, which has once melted its Substance, but that it never has been in the Fire ; never melted at all : As to the Doctor's Allusion to the *Hæmatites*, it is a borrowed one, he has from the Works of the Author of these Papers, on this very Subject ; but, as it is the peculiar Prerogative of Authors of this Stamp, to make every thing their own, when they repeat it, he has mistaken the Analogy this Author discovered between these two Bodies, which was, only that they had both had the same Manner of Formation, not that either of them had ever been formed by Fire. We

shall allow the Doctor, therefore, the Force of the whole Analogy as he has recited it, and agree that the Turquoise is as certainly formed by Fire as the Hæmatites, for that both of them have a very different Origin.

The striated Texture of this Body, tho' it is expressly against its having been formed by Fire, is not at all against the other System of *de Boot's* of its being a Transudation from the Rocks to which it adheres: A Matter protruded out of the extremely small Pores of a solid Body, might indeed very easily form itself into slender Filaments, and a Multitude of these arranged together might form, as they were farther or less far protruded, a semiglobular Body; and finally, a Number of these Bodies placed Side by Side, and joined by cohering together while moist, might form a botryoid Body of twelve Inches long, such as the Doctor describes. There is considerably more Reason therefore on the Side of *de Boot's* Opinion, which the Doctor rejects, than of his own, which because it appears demonstrated to him, he expects will appear so to every Body else. He adds, that one Part of his Specimen appears rough, as if broken off from the Rock it was affixed to; this carries a bad Face, when we compare it with the other Matter of Melting, but it agrees very well with *de Boot's* System of its being formed by Transudation. It does appear to us indeed that the Formation of this Specimen of the *Turquoise of Dr. Mortimer*, (for so it ought forever to be called) and of the Hæmatites of the botryoid Kind are the same: That they both are formed of Matter once contained in the Rocks, to whose Surface they adhere, or else raised in Vapour and affixed to them; in either of which Cases a striated Texture may be accounted for, tho' not by Melting; and that the Hæmatite, which is at least as rich in Iron as this Specimen of the Doctor's Turquoise was in Copper, not only forms itself into botryoid Surfaces in this Manner, but even frequently, where the Position will admit of it, every Bubble elongates itself into a cylindrick or conic Body, whose Length is five, ten, twenty, nay, in some Cases, forty Times its Diameter: The Stalactites of Iron, which are almost pure Iron, are many of them only elongated Bubbles of Hæmatites, which have hung to the Roofs of the same subterranean Caverns, on the Sides of which the same Matter has formed itself into the common Bubbles the Doctor speaks of: These Stalactites we shall not refuse to shew the Doctor many Kinds of, if his noble Soul can condescend to be informed
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beyond *Demonstration*, and himself will acknowledge, that these, tho' real Hæmatites, could not be formed by Fire, tho' by the Method we have laid down they might; and as he refers the Origin and Formation of the famous Substance he describes to that of this Substance, it will follow that this was not formed by Fire neither.

If the Doctor, however, will not receive this as *Demonstration* against *Demonstration*, there is yet another Way of proving the Error of his System to him: He is a Chymist, and he even tells us, that he examined this Body in the Chymical Way: He must have a strange Knack at Operations, not to find out that this Stone was not of the fusible Kind, but of the calcarious, of such as cannot be melted by Fire, and therefore, that his Supposition of its having received its present Form by Melting, is inconsistent.

The Doctor's Stone (for we had ourselves a Piece of it, and experimented upon it too) was of the Nature of Spar, a Substance that will ferment with Acids, and that will burn to Lime, not melt in the Fire. We do not pretend to invalidate the Doctor's Account of a Slag or half vitrified Substance being produced from it, he only does not express himself intelligibly; that Slag was the Produce of the Mass after its Form as a Turquoise was destroyed, it was the Result of its metalline Matter, running after the stony Part had been calcined: And such as this Slag must have been its State in the Earth, if it had been formed by Fusion there; the stony Part must have been calcined and separated before this could have happened, and only its metalline Part without the striated Texture or green Colour, without any thing to make Dr. *Mortimer* take it for a Turquoise could have remained. As to the Doctor's Proofs that it is the true Turquoise, and the others the false ones, they are like the rest: He is sure of it because he finds it to be a rich Copper Ore: But did ever any body give it as a Character of a Turquoise to be a rich Copper Ore? that Bodies containing Copper, nay, such as are properly to be called Copper Ores, are met with under the Name of Turquoises, is an Assertion the Doctor had met with also in the same Dr. *Hill's* Book of Fossils, but he has perverted it, according to his invariable Custom; for his Author does not say, that because some Copper Ores are cut as Turquoises, therefore all Turquoises are Copper Ores; this is an original Assertion of Dr. *Mortimer's*, and is indeed of a Piece with all the rest of the Paper it stands in.

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He tells us afterwards, that his Turquoise was just of the Consistence of common white Marble: This would be but a very poor Degree of Hardness for a Gem. The Turquoises are, in reality, but soft, but they are much harder than white Marble; and another unlucky Circumstance, in regard to the Doctor's, is, that it is as much softer than that Substance. He seems to speak it as a wonderful Thing, that the Degree of Heat he gave it did not mend its Colour; we may add, that we should think it something extraordinary, if a Heat sufficient to melt a Tile did not destroy it; but this is a Secret he did not chuse, for his own Sake, to tell us. The Reader may wonder at his wondering that Heat did not mend the Colour of his; but we are to explain it to him. Heat is delivered by the Author, whom this Societarian Writer has a mind to quarrel with, if he had dared to do it, as the Means of diffusing the blue Colour over what the Doctor calls the false Turquoises, when they are deep in some Parts, and pale or wanting it in others, but he does not discover that neither this Author, nor any body else, ever thought of mending the Colour of a green Piece of Copper Ore by it.

His other Assertion, that it grows brittle by being heated, agrees very well with our Account of its Origin, but very ill with his, who supposes it to have been melted before it acquired the Form we see it in. He adds, that it would not calcine as Bone would have done, but run into a Slag: If we were to judge of the Doctor's Skill in Metallurgick Operations by his Account of this, we should be obliged to declare him as profoundly ignorant in that Branch of Knowledge as in the rest.

He errs, in saying that the stony Part of this, which is sparry, will not calcine, for it absolutely does calcine very early in the Operation; he would not surely have the Copper it contains, which himself allows to be a great deal, calcine too: We are to tell him, that if he could find the Way to impregnate a Bone as strongly with Copper as this Stone was, and perform the same Operations on it, he might, from the Result of it, demonstrate in the same Manner, that a Bone would not calcine; for doubtless after the Calcination of the Bony Part, the Remains of which so accurate an Operator as the Doctor might easily take for Dirt or Ashes, the Copper that it had been impregnated with would run into a solid Mass.

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The Doctor concludes his Paper, with what he doubts not but the World will own an incontestable Thing in his Favour; this is, that Sir *Hans Sloane* has several Botryoide Turquoises in his Collection: We allow the full Truth of this; and have already allowed, that Botryoide Bodies are received by our Jewellers as Turquoises; but unhappily for the Doctor, there is not one of all Sir *Hans's* that is at all like his. If his must be allowed a Turquoise of the old Rock, because Sir *Hans Sloane* has Botryoide Turquoises, [every Botryoide Hæmatite in the World may be demonstrated to be a Turquoise of the old Rock by the same Argument.

Upon the whole, the Substance described by Dr. *Mortimer* in this Paper, under the Name of a Turquoise of the old Rock, and established as a Sort of Standard, by which to determine for the future what are, and what are not Turquoises, is itself no Turquoise at all, but a mere sparry Ore of Copper, tinged to a strong green Colour, with some subterranean Solution of that Metal. Ores of the same Metal, of a Botryoide Appearance, and of a fine blue Colour, are sometimes sold as Turquoises, and these will sometimes become green, but never of the Sort of variegated Green and White of this Substance.

As to what is, and what is not the genuine Turquoise, the World is not to be determined by an Author of the Doctor's Stamp. It is certain that the Name is at present given to two Substances, but if we would give it to the most beautiful and most in Use of the two, with the Addition of True, it is the bony Turquoise, and not the other, that has a right to it. If we enquire among the Jewellers what it is that is in general received, sold, and worn, as the Turquoise, it is the bony Kind, or that which is formed of some Animal Bone or Tooth, altered by lying in the Earth, and tinged there by cupreous Particles to a blue Colour. There are Mines of this in *France*, which are constantly worked for it, a vast Profit arises from them, and a great Part of *Europe* is supplied with Turquoises from thence.

Many of the Turquoises brought from *Turkey*, *Persia*, and other Parts of the *East*, are evidently of the same Kind with these, plainly carrying the Structure of Bone still with them: Others are brought from that Part of the World of the Botryoide Kind, which are Efflorescences of Copper Ore, found adhering to the Rocks that contain that Metal, as the Botryoide Iron Ores or Hæmatites do to those with us which contain Iron. This is the Substance which *Pliny* calls Callais; it is of

the same Colour with the others, and when harder than ordinary, as it is sometimes met with, is vastly more valuable than any other Kind.

The Term *Turquoise* is a Name given merely by the Jewellers, and therefore belongs to every Thing that they have been used to call by it; as to the Epithets of *True* and *Bastard* they do not employ them: If the Doctor would mean to express by them what they mean by *Turquoises* of the new and old Rock, it would not answer the Purpose he intends, for they call any *Turquoise* of the old Rock that retains its Colour, and any thing of the new Rock that loses it, so that the *Bortyoid* *Turquoise* when turned green are said to be of the new Rock, as well as such Pieces of the others that are so. I have elsewhere commemorated, to the Honour of some Jewellers, their declaring a *Turquoise* to be one of the old Rock; but there is yet greater Honour due to a Person of the Doctor's Acquaintance in the same Trade, who declared a Piece of blue Enamel to be so.

We have been the more large in our Animadversions on this Paper, as it conveys so very clear an Idea of the Character of this truly societarian Writer in the several Capacities of the Scholar, the Philosopher, and the Chymist: It was a Sort of Debt to ourselves also to explain his Qualifications thus far, lest those Observations he has picked up from our Mouths, and put down with *C. M.* at the End of them, as Notes on the Transactions, should be supposed by the ignorant Reader to be his own. Some Observations and Annotations indeed marked with the same Letters will be easily discovered to belong to himself; they will be distinguished from the rest without our particular Enumerations of them.

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The CONCLUSION.

WE have thus gone thro' an Examination into the real Merits of a very considerable Number of the Papers, which have hitherto been esteemed the best and most unexceptionable in the Transactions of the *Royal Society* of *London*, called by the Publishers of them *Philosophical* ones. We flatter ourselves it will appear that they are not what that Society, when they heard them read, and afterwards ordered them to be printed in their Name, believed them to be ; and we hope such a Conviction, as that Body must receive of the Truth of this, will plead in Favour of a more strict Enquiry into the Merits of what shall be offered hereafter ; and that in better Time. It remains only to add, that not a Hatred to the *Royal Society*, but a Love for the Studies that Society was established for the Promotion of, has occasioned the Publication of this Refutation of the Errors advanced by its Members, and established under the Sanction of its Name. Perhaps also some Share in the determining on so unpleasing an Office is to be attributed to an honest Zeal for the Credit of our Country : We cannot but wish the Men of Eminence in other Parts of the World may be informed, that the Ignorance of the *Royal Society* is not Epidemic among us, nor would suffer them to suppose they have a Right to say, the *English* are in an Error on any Subject, because an erroneous Account of it appears in the *Philosophical Transactions*.

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Hill, John

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